REPORT

ON THE

OIL-PRESSING INDUSTRY

OF THE

BOMBAY PRESIDENCY,

BY

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Part I.

CHAPTER I.

In their Resolution No. 4518 of 12th July 1912, the Government of Bombay intimated "that they had under consideration the question of instituting an industrial survey of the Presidency and that they had examined the measures recently initiated in other Provinces in India for studying the industrial position and possibility of those areas".

In pursuance of these views the surveys of the handloom and leather industries of the Bombay Presidency were carried out in 1908 and 1910.

They then decided to institute a survey of the oil-pressing industry of this Presidency and they directed me to carry on the work with effect from 1st of October 1912.

I was directed "to visit all the chief centres of the oil-pressing industry in the Bombay Presidency inclusive of Sind, whether conducted in factories on an extensive scale or carried on by the indigenous method in vogue with the country Telis". I was to make a thorough investigation of the methods and conditions of the industry in both these aspects and submit a comprehensive report thereon. In dealing with the indigenous industry, I was to indicate the special difficulties with which it has to contend and the practical measures which in the light of my nvestigations I would recommend for its development and improvement. I considered that the object of the present inquiry should essentially be to enquire—

(*a*) into the present economic condition of the Telis and to suggest means for its improvement;

(*b*) to examine the conditions under which modern methods are employed in the Presidency for oil-pressing and to compare these methods with the indigenous one of the country Ghani.

With this end in view, I have attempted to enquire into the causes of failures of Oil Mills and have tried to indicate how such failures could be overcome. I have devoted particular attention, in agreement with the Government Resolution on the subject, to the possibility of successfully establishing Cotton-seed Oil Factories. I have considered the causes which have prevented their successful running until now and have also looked into the general question of developing the oil-pressing industry in this Presidency not only from the Cotton-seed but also from Groundnut, Tilseed, Linseed, Kardi and Rapeseed.

I travelled extensively in the most important areas of seed crushing and seed cultivation and collected information from private individuals interested in the trade as well as from Government officials. I visited Bulsar, Billimora, Navsari, Surat, Broach, Baroda, Ahmedabad, Sabarmati, Kadi, Mehsana, Sidhpur and Palanpur in the Province of Gujarat—places where there have been established for some years oil-pressing concerns. Places visited in Kathiawar were Wadhwan, Dhrangadhra, Morvi, Rajkot, Jamnagar, Gondal, Dhoraji, Porebunder, Junagadh, Bhavnagar, Songadh and Limbdi.

In the Deccan Districts important centres that I visited were Jalgaon, Dhulia, Chalisgaon, Ahmednagar, Dhond, Barsi, Pandharpur, Poona, Sholapur and Satara. In the Southern Division I made a short tour of inspection, during the course of which I visited Bijapur, Hubli, Dharwar, Gadag, Belgaum, Sangli and Kolhapur.

I am very thankful to District Officers and to the Princes and Native State officials for the help they rendered me during my tours of inspection. Particularly in places where I had to make very detailed investigations, I was given material assistance by the District Officers and their subordinates.

The Kathiawar Peninsula is a territory abounding in immense possibilities for the oil-pressing industry. I was very glad to find that the Chiefs of Dhrangadhra, Morvi and Limbdi are taking a keen interest in the development of the industry, specially in utilizing cotton-seed for oil-pressing.

The Province of Sind stands out by itself as an important seed-growing area, where only the indigenous method of oil crushing by means of ghanis is in vogue. In this Province there are, apart from cottonseed, two most important seeds which, as a matter of fact, are peculiar to Sind-Jambho and Sarreh. I visited Mirpurkhas which is the largest cotton-growing and ginning centre in Sind, Hyderabad and Karachi, which latter possesses the only two oil mills equipped with the latest type of machinery. Sukkur and Shikarpur were also visited and at both of these places mills are to be soon started. The Collector of Sukkur, Mr. Macmillan, has evinced a keen interest in the scheme and it is very likely that a successful addition will be made to a number of oil mills in Sind.

It will be as well here to consider the general volume of the oil-seed trade in the Bombay Presidency and Sind. I give in the appendix A, B, and C, statistics dealing with—

(*a*) the export of oil and seed and cake,

(*b*) the import of refined oil,

(*c*) the area under cultivation for different oil-seeds.

As will be seen from the appendix, the total area under cultivation in the Bombay Presidency in 1912 was 3,952,585 acres and in Sind it was 335,656 acres. It may be of interest here to look over some useful statistics concerning this industry and particularly the Indian trade in oil-seeds.

Bombay Presidency.

Oil-seeds.

	1908.	1909.	1910.	1911.	1912.	1913.
Export	14,059,244	9,238,560	17,681,954	19,072,940	17,240,001	51,854,002
Import	36,233	67,582	21,918	14,535	22,500	13,508
Cake.						
Export	262,290	192,341	162,155	223,846	203,331	265,912
Import	*Nil.*	*Nil.*	*Nil.*	*Nil.*	*Nil.*	*Nil.*

Refined oil.—It would have been of great use for this enquiry if figures in this particular branch had been available. I regret to note, however, that such statistics cannot be had.

There is no reason why with better agricultural facilities this area should not be increased. I would particularly like to point out that by resorting to (*a*) a scientific rotation of crops and (*b*) careful seed selection, the depleted productivity of cotton-growing fields can be materially increased by planting in them leguminous crops. This system prevails extensively in the southern portion of the United States of America and is suitable for application in this country also. I shall consider it in detail in the chapters to follow.

CHAPTER II.

I propose now to describe the details of working, etc., of the more important oil-pressing concerns in the Bombay Presidency which make use of modern machinery. It is only by carefully analysing the working of each important mill, that we can come to understand why some of them have not been running satisfactorily. I have observed throughout however that this want of successful running is chiefly due to an insufficient and sometimes a wrong type of machinery, as also inexperienced management and to paucity of skilled labour.

I now proceed to describe in detail the working of some noted oil-pressing concerns :—

The Indian Cotton Oil Company, Limited, Navsari.

The Indian Cotton Oil Company, Limited, has its factory situated in a small village named Vejalpur about a mile away from Navsari. This is practically the only cottonseed oil mill in Western India running successfully. It has a complete hydraulic plant in every respect, inasmuch as it has got linters, hullers, separating machinery, rolls, etc. It has also got now a refinery to utilise its own crude oil. When the mill was first started, it had only two standard presses of American manufacture, their crushing capacity at the time being about 18 tons per day of 24 hours. But recently they have added one more press and thus increased its capacity to about 30 tons a day. I am informed by the agents that they are going to double their present capacity soon. This company in the beginning had a nominal capital of rupees two lacs but recently they increased their capital (nominal) to ten lacs. In the early part of their working they used to ship their crude oil to England.

Most of their cake is exported to Europe where it is used as cattle food while their refined oil finds a ready market in the Presidency and I am informed that very often they are not able to cope with the demand. Hulls are used up locally mostly by dairy cattle as a fodder. Soap-stock, a waste product left after refining crude oil, is used for soap making and it fetches a fairly good price. The concern on the whole is well managed and oil, the chief bye-product of cotton-seed, which they put out is of a good quality for use as edible oil and many instances have been noticed where it has been used in place of ghee.

Shri Nurmada Cottonseed Oil Company, Limited, Broach.

This mill was started at Broach about the latter part of 1908. It has a crushing capacity of 7-8 tons a day. It had linting and decorticating machinery and also a refinery attached to it. The attempt of those, who worked the concern successfully, proved abortive inasmuch as those at the head of it were quite ignorant of the industry, and still less about the market. All along there was mismanagement and the financial situation was very bad.

Shri Sayaji Cottonseed Oil Company, Limited, Baroda.

This factory started just about the same time as the Broach mill. It had machinery on the English style to work whole cottonseed. The chief difficulty here was that the yield of oil extracted was very poor and the refining loss was very heavy. It also had a disadvantage of site since it was not situated on the main line and the freight charges owing to its being near the branch line used to go up rather heavy owing to transhipment. Also being some distance away from the town the oil merchants had to pay a little more for the oil for local consumption. When this company saw that they could not work cottonseed at a profit they decided to work castorseed, tilseed and groundnut but there too it seems they did not succeed well. The firm of agents changed hands with no better results and the mill is not now working and probably the company will go into voluntary liquidation before long.

The Parikh Manilal Chunilal Oil Mills, Petlad.

This mill has got two presses and nine ghanis. The crushing capacity per day of 12 hours is about 4 to 5 tons. Seed worked is chiefly castor, til and kardi.

Thasra Oil Mill, belonging to one Govindlal Desai.

There are two small presses. The crushing capacity is about 2½ tons per day. Castor and mowra seeds are chiefly crushed.

The Rajnagar Oil Mill and Manufacturing Company, Limited, Ahmedabad.

This mill works castorseed most of the year round and finds always a ready market for the bye-products namely, oil and cake. All their oil is sold locally for lubricating purposes and the cake is shipped mostly to Poona side where it fetches a good price as a manure for sugarcane plantation. Their working capacity per day of 12 hours is 7 tons. They attempted to crush tilseed, etc., but could not do it successfully, since owing to steam in the kettle a slight coloring matter precipitated from the finer seed-shell. Thus their manufactured oil was much inferior in quality to the oil manufactured by the ghani which entails always a 'cold drawn' process. Here the management is efficient and seed is stored up at a time when the market is very low owing to a good financial arrangement.

There is another mill here called *The Gujarat Oil Mill and Manufacturing Company, Limited.* This mill has got six presses in all, 4 Anglo-American presses and 2 Premier presses. The capacity per day of 12 hours is about 12 tons. Most of the machinery in this mill is by Messrs. Rose Downs and Thompson, Limited. This mill at present works castorseed. They used to work some time ago linseed and prepare double boiled linseed oil but owing to their not finding a market for the above oil they had to discontinue linseed and take up castorseed which has a good and ready demand right in Ahmedabad. Their yield is about 40 per cent. oil and 54 per cent. cake. In case of castorseed about 6 per cent. goes as dirt and waste.

The Saraswati Oil Mill, owing to mismanagement, has gone into liquidation and there is another mill called *The Vishnu Rice and Oil Mill.* This mill also crushes castorseed. It has got one expeller and about half a dozen rotary ghanis.

At Sabarmati there is a big mill, crushing only castorseed. It crushes about 12 tons per day of 12 hours. The bye-product, that is to say, oil, is mostly used for lubricating purposes in the B. B. & C. I. Railway. This mill is worked by the B. B. & C. I. Railway. It has got 4 box plates and 6 plate presses. The men employed here number 80 to 100. This is very cleanly kept mill.

At *Sidhpur* there are already two oil mills and one is to be started soon.

The Mahomedan Flour and Oil Mill has a capacity of 4 tons a day. It crushes tilseed, castorseed and rapeseed. It works most of the year round and has a daily capacity of 4 tons per day of 12 hours. It has got three presses and a dozen rotary ghanis and one expeller.

Another oil mill at Sidhpur is called the *Abdulhusein, Mulla Ahmedji and Company Oil Mill.* It works mostly til and rapeseed. It has got 11 ghanis, and two hand presses. Its daily capacity is about 1½ tons per day of 12 hours.

The Manik Oil Mill, Sholapur.

This mill has two presses. The crushing capacity is about 2½ tons per day. Seeds chiefly crushed are castor and groundnut.

At Hubli the *New Prince of Wales Oil Mill* worked for a time without success and most of the machinery was removed to Pulgaon, C. P.

At *Shirpur in Khandesh* there was an oil mill started in 1906. It worked for a time and not being financially successful it went into voluntary liquidation. Its rated capacity was about 5 tons a day and tilseed, linseed and kardi used to be crushed. It had two hydraulic presses, a roller mill, kettle and other pressing machinery. It was called the *Dattatraya Oil Mill.*

Until very recently the machinery commonly in use in these mills was the hydraulic press; now however some mills are utilizing a new process of oil mill

machinery called the Anderson Oil Expeller. This is to be found working in about 12 concerns.

There are four of these Anderson Expeller plants working at different places in Bombay crushing mostly groundnuts, each Expeller having a crushing capacity of about 2 to 3 tons per day. Their manufacturing cost when worked by oil engines is much lower than any of the oil milling processes in existence. It gives as much yield of oil as by any of the best hydraulic processes, ghani and hand presses.

There is an Expeller mill at Kolhapur working on groundnut and kardi. An Expeller mill at Sangli also crushes groundnut and kardi. There is one Expeller mill at *Belgaum*, it crushes kardi, groundnut and tilseed.

At *Bijapur* also there is an Expeller mill working on kardi and groundnuts, it has at present only one Expeller but additions are contemplated.

At *Surat* there is an Expeller mill in connection with a rice and flour mill. They are at present working tilseed and groundnut but expect to work castor-seed chiefly.

At *Karachi* there are two Expeller mills worked by Anderson Oil Expeller. They crush mostly kopra and they find a ready demand for their products locally.

I should finally mention here a newer type of concern called the *Hindusthan Oil Mills, Limited*, started in Ahmedabad which has utilised the most up-to-date and automatic machinery available. This is a mill using two Expeller oil plant. The site selected is just close to the Railway Goods Siding. The company expects to work tilseed, which cannot be worked decently elsewhere, and cottonseed also, and to add a refinery shortly. Owing to its specially suitable position, *i. e.*, its location between the broad and metre gauge lines, the mill enjoys a unique advantage in export and import.

Bombay.—As regards Bombay which possesses nearly 150 rotary power ghanis, there are in the city two well known concerns, *viz.*, the Bombay Flour and Oil Mills, owned by Volkart Brothers, and the Argyle Oil Mill. Their total crushing capacity is nearly 50 tons per day. Owing to various reasons, the Jamshed Oil Mills owned by Tatas have recently stopped working. As Government wanted their ground-site, the Peru Mahomed Oil Mills, which were working with a capacity of 30 tons a day, went into voluntary liquidation. Bombay appears to afford as an export centre special opportunities for the starting of oil mills.

CHAPTER III.

Detailed consideration of the oilseeds in use.

A.—The principal oilseeds in use are Tilseed, Linseed, Castor, Rapeseed, Jambo, Kardi, Groundnut and Nigerseed.

Northern Division.

	Ahmedabad.	Broach.	Kaira.	Panch Mahals.	Surat.	Thana.
Cotton ...	p	p	p	p	p	a
Groundnut ...	a	a	a	a	p	a
Niger ...	a	a	a	a	p	p
Sesame ...	p	p	p	p	p	p
Castor ...	p	p	p	p	p	p
Safflower ...	a	a	a	a	a	a
Rape ...	a	a	a	a	a	a
Mowra ...	p	p	p	p	a	a
Cocoanut ...	a	a	a	a	a	a
Linseed ...	a	a	a	a	a	a

Southern Division.

	Belgaum.	Bijapur.	Dharwar.	Kanara.	Kolaba.	Ratnagiri.
Cotton ...	p	p	p	a	a	a
Cocoanut ...	a	a	a	p	p	p
Niger ...	p	p	p	p	p	p
Sesame ...	p	p	p	p	p	p
Castor ...	p	p	p	p	a	a
Safflower ...	p	p	p	a	a	a
Rape ...	a	p	p	a	a	a
Groundnut ...	p	p	p	a	a	a
Mowra ...	a	a	a	a	a	a
Linseed ...	p	p	p	a	a	a
Hemp ...	p	p	p	a	a	a

Central Division.

	Ahmednagar.	East Khandesh.	West Khandesh.	Nasik.	Poona.	Satara.	Sholapur.
Cotton ...	p	p	p	p	p	p	p
Groundnut ...	p	p	p	p	p	p	p
Niger ...	p	p	p	p	p	p	p
Sesame ...	p	p	p	p	p	p	p
Castor ...	p	p	p	p	p	p	p
Safflower ...	p	p	p	p	p	p	p
Rape ...	a	p	p	a	p	a	a
Mowra ...	a	p	p	a	a	a	a
Linseed ...	p	p	p	p	p	p	p
Hemp ...	a	a	a	a	a	p	p

Sind.

	Hyderabad.	Karachi.	Sukkar.	Larkhana.	Thur and Parkar.
Cotton ...	p	p	p	p	p
Sesame ...	p	p	p	p	p
Rape ...	p	p	p	p	p
Jambho ...	p	p	p	p	p
Niger ...	p	p	p	p	p
Castor ...	a	p	a	a	a
Cocoanut ...	a	p	a	p	a

p = present. a = absent.

Products and Bye-Products of the seed and the purposes to which they are put.

B.—There are for instance :—

Tilseed. Edible purposes.	Oil. Edible purposes.	Cake. Cattle Food.
Linseed.	Oil. Edible purposes. Manufacturing Paints and Varnishes.	Cake. Cattle Food.
Kardi.	Oil. Edible purposes. Good semi-drying oil. It is also used as good oil paint for drawing artistic designs on woollen cloths. It is also used as a burning oil.	Cake. Cattle Food. Manure.
Poppy Seed.	Oil. Used for edible purposes, also as fixing agent for artists' paints.	Cake. Cattle Food. Manure.
Rapeseed.	Oil. Edible purposes. Semi-drying oil. Lubricating purposes and burning.	Cake. Cattle Food.
Jambho Seed.	Oil. Used for burning, medicinal and edible purposes.	Cake. Cattle Food. Manure.
Groundnut Seed. Edible purposes.	Oil. Edible purposes and Soap-making.	Cake. Cattle Food.
Castor Seed.	Oil For medicinal use, hard soaps. Turkey Red Oils for lubricating purposes for locomotive bearings. Also used as a preservative for leather belting in heavy work and for fat liquoring in the leather industries.	Cake. Manure. Fuel. Caulking timber for destruction of white ants and other pests, and for stuffing the soles of native shoes.
Mowra Seed.	Oil. Has a bitter aromatic taste. It is called Dolia Oil. Fills the place of tallow where the religious tenet forbids the employment of the latter. Is used in the treatment of skin diseases. Is also used in the candle and soap-making.	Cake. Poisonous. Used only as fuel and manure.
Cocoanut.	Oil. Soap-making. Edible purposes. Manufacture of vegetable butter. Manufacture of candles.	Cake. Used as food for Dairy cows and buffaloes.

Area of Demand for the Products.

Most of the oil to a great extent can be consumed locally. The cake manufactured by factory method is being exported to foreign countries such as Germany, France, England, Belgium, Italy, etc. The chief reason for so doing is that there is such a great prejudice started by the Telis and others that this oil cake is not suitable for feeding or manurial purposes. The cake produced in the country ghanis secures a price in some respects almost 50 per cent. higher than the other cakes received in Europe. As a matter of fact there is practically no difference in manurial purposes of the cake whether produced by machinery or in country ghanis. Same is the case as regards the feeding value of cake, because about 7 per cent. of oil or Carbo Hydrate are essential as feeding value for the animal system. Over and above 7 or 8 per cent. of Carbo Hydrates is a waste for feeding purposes to the cattle. Of course, the form of the ghani cake is different from the machine-made cake, but that should make no difference as a feeding value.

Tabular Statement shewing the average percentage of oil from the same seed but cultivated in different districts.

Name of Districts.	Name of Variety.	Percentage of oil.
Groundnut.		
Surat Farm	Pondicherry ...	48·30
Satara	Do. ...	46·86
Satara	Do. ...	46·30
Satara	Do. ...	48·43
Satara	Do. ...	46·80
Dharwar	Do. ...	50·38
Surat	Do. ...	53·75
Dharwar	Do. ...	52·33
Dharwar (irrigated)	Do. ...	47·67
Dohad	Do. ...	46·76
Surat	Do. ...	49·41
Dharwar	Do. ...	49·66
Dharwar (early)	Do. ...	52·98
Dharwar Farm	Do. ...	47·97
Gokak	Do. ...	47·29
Surat	Do. ...	46·26
Dharwar	Do. ...	41·55
Dharwar	Do. ...	45·30
Surat	Egyptian ...	46·43
Dharwar	Do. ...	50·09
Dharwar	Do. ...	54·31
Dharwar (irrigated)	Do. ...	48·79
Surat	Do. ...	50·66
Surat	Do. ...	49·93
Dharwar	Do. ...	48·02
Dharwar (early)	Do. ...	47·90
Dharwar	Do. ...	44·90
Surat	Do. ...	44·32
Dharwar	Do. ...	41·60
Surat	Senegal ...	45·36
Surat (irrigated)	Do. ...	47·92
Surat (unirrigated)	Do. ...	48·21
Dharwar	Do. ...	57·12
Dharwar (irrigated)	Do. ...	47·99
Surat	Do. ...	41·99
Dhulia	Do. ...	44·99
Dohad	Do. ...	44·45
Surat	Do. ...	50·52
Surat	Do. ...	49·08
Dharwar	Do. ...	51·12
Dharwar	Do. ...	51·29
Dhulia	Do. ...	52·40
Dharwar	Do. ...	46·36
Gokak	Do. ...	45·96
Dharwar	Do. ...	40·60
Baroda	Do. ...	44·50
Dharwar	Do. ...	49·80
Baroda	Do. ...	46·55
Surat	Virginia ...	47·21
Dharwar	Do. ...	43·45
Surat	Do. ...	48·66
Dhulia	Do. ...	46·00
Dharwar	Do. ...	49·73
Dharwar (irrigated)	Do. ...	47·89
Surat	Do. ...	50·91
Dhulia	Do. ...	44·89
Dohad	Do. ...	44·74
Dhulia	Do. ...	49·14
Surat	Do. ...	50·44
Dharwar	Do ...	44·43
Dharwar (early)	Do. ...	48·84

Name of Districts.	Name of Variety.	Percentage of oil.
Groundnut—continued.		
Dohad	Virginia ...	51·17
Dhulia	Do. ...	48·10
Gokak	Do. ...	47·58
Surat	Do. ...	48·91
Dharwar	Do. ...	41·25
Dharwar	Do. ...	44·85
Surat	Japanese, big ...	46·21
Jamkhed	Do. ...	40·87
Jeur	Do. ...	44·22
Sholapur	Do. ...	44·26
Sinnar	Do. ...	45·64
Nasik	Do. ...	44·86
Satara	Do. ...	44·30
Dharwar	Do. ...	48·94
Surat (irrigated)	Do. ...	45·69
Surat (unirrigated)	Do. ...	48·05
Dhulia	Do. ...	43·42
Dharwar	Do. ...	49·66
Dharwar (irrigated)	Do. ...	47·89
Surat	Do. ...	49·27
Surat (mixed)	Do. ...	46·00
Dhulia	Do. ...	46·46
Dohad	Do. ...	44·46
Surat	Do. ...	49·62
Dhulia	Do. ...	50·72
Surat	Do. ...	49·87
Dharwar	Do. ...	47·67
Dharwar (early)	Do. ...	47·45
Dohad	Do. ...	49·80
Dhulia	Do. ...	47·21
Dharwar	Do. ...	49·35
Gokak	Do. ...	45·10
Surat	Do. ...	49·10
Dharwar	Do. ...	39·60
Surat	Do. ...	42·75
Dharwar	Do. ...	45·95
Dharwar	Do. ...	43·50
Surat	Japanese, small ...	50·48
Dharwar	Do. ...	49·04
Surat	Do. ...	51·63
Dharwar	Do. ...	53·91
Surat	Do. ...	47·87
Surat (unirrigated)	Do. ...	45·41
Dohad	Do. ...	46·51
Surat	Do. ...	51·49
Surat	Do. ...	53·67
Dharwar	Do. ...	47·55
Dharwar (early)	Do. ...	51·11
Dohad	Do. ...	53·64
Dhulia	Do. ...	46·11
Dharwar	Do. ...	48·00
Surat	Do. ...	50·96
Dhulia	Do. ...	48·39
Dharwar	Do. ...	45·67
Surat	Do. ...	47·70
Baroda	Do. ...	47·00
Dohad	Do. ...	47·80
Dharwar	Do. ...	45·80
Baroda	Do. ...	48·65
Surat	Surat ...	46·64
Dharwar	Do. ...	47·62
Surat	Do. ...	46·63
Dharwar	Do. ...	52·50
Surat	Do. ...	48·93
Surat	Do. ...	45·33

Name of Districts	Name of Variety.	Percentage of oil.
Groundnut—continued.		
Dharwar	Surat ...	42·89
Surat	Do. ...	46·03
Dharwar	Do. ...	40·65
Surat	Spanish ...	47·31
Satara	Do. ...	44·69
Sholapur	Do. ...	45·66
Dharwar	Do. ...	52·91
Surat (irrigated)	Do. ...	49·04
Surat (unirrigated)	Do. ...	47·67
Dharwar	Do. ...	53·34
Dharwar	Do. ...	54·34
Surat	Do. ...	47·32
Dhulia	Do. ...	51·37
Dohad	Do. ...	44·38
Surat	Do. ...	50·59
Dhulia	Do. ...	52·19
Surat (irrigated)	Do. ...	53·64
Dharwar	Do. ...	47·22
Dharwar (early)	Do. ...	45·47
Dohad	Do. ...	50·80
Dhulia	Do. ...	45·16
Dharwar	Do. ...	48·50
Baroda	Do. ...	49·45
Surat	Do. ...	46·91
Dharwar	Do. ...	43·15
Surat	Do. ...	47·15
Baroda	Do. ...	49·45
Dhulia	Do. ...	44·20
Dohad	Do. ...	47·95
Dharwar	Do. ...	45·40
Baroda	Do. ...	49·25
Surat	Mauritius ...	46·43
Dharwar	Do. ...	50·22
Surat	Do. ...	46·75
Dharwar	Do. ...	47·69
Surat	Do. ...	50·80
Surat	Do. ...	51·02
Dharwar	Do. ...	47·83
Dharwar	Do. ...	45·34
Dharwar	Do. ...	37·90
Dharwar	Do. ...	45·25
Surat	Mozambique ...	48·32
Dharwar	Do. ...	53·12
Surat	Do. ...	48·21
Surat	Do. ...	49·50
Dharwar	Do. ...	50·08
Surat	Do. ...	45·71
Dhulia	Do. ...	48·25
Dohad	Do. ...	41·63
Dhulia	Do. ...	51·66
Surat	Do. ...	50·63
Dharwar	Do. ...	47·65
Dohad	Do. ...	50·98
Dharwar	Do. ...	49·97
Gokak	Do. ...	46·52
Surat	Do. ...	45·80
Dharwar	Do. ...	42·25
Dohad	Do. ...	47·50
Dharwar	Do. ...	45·05
Castor.		
Surat	Surat ...	46·08
Surat	Do. big ...	48·37
Poona	De. small ...	48·83

Name of Districts.	Name of Variety.	Percentage of oil.
Castor—continued.		
Poona	Local, small ...	52·47
Surat	Surat, big ...	48·90
Surat	Do. small ...	44·35
Surat	Local, small ...	47·35
Dohad	Small ...	48·92
Ahmedabad	.....	46·66
Ahmedabad, small	.....	48·54
Karjat	.....	48·48
Broach	.....	48·78
Panch Mahals	.....	48·84
Belgaum	.....	46·54
Poona	.....	47·63
Thasra	.....	51·97
Sholapur	.....	48·64
Nasik	.....	49·11
Nasik	.....	48·78
Ahmednagar	.....	45·74
Nasik	.....	47·26
Bijapur	.....	48·94
Kaira	.....	52·90
Kaira	.....	52·81
Ahmedabad	.....	47·82
Panch Mahals, big	.....	46·96
Panch Mahals, small	.....	50·39
Baroda	.....	48·09
Khandesh	.....	45·77
West Khandesh	.....	48·14
Sholapur	.....	52·75
Satara	.....	50·41
Nasik	.....	47·36
Gokak	.....	49·69
Belgaum	.....	46·67
Linseed.		
Dharwar	Dharwar ...	38·87
Dhulia	Do. ...	40·40
Dharwar	Do. ...	48·39
Dharwar	Do. ...	41·20
Dhulia	Khandesh ...	41·51
Dharwar	Do. ...	40·90

Dharwar Farm.

SAFFLOWER :—

Dharwar.	Nadiad.	Poona.	Bijapur.	Khod.	Bagewadi.
38·85	36·95	33·40	34·63	33·63	33·72
31·48	32·20	33·54	33·54	31·07	30·00
30·50	31·00	30·00	31·40	28·90	.....
31·50	.....	.....	.....	.....	.....

NIGER :—

Dohad Farm.	Sampgaon.	Dharwar.	Bellary.	Ranebennur.	Surat.	Dohad.	Dharwar Farm.
40·83	40·87	42·60	42·59	42·97	43·29	43·58	45·58
45·29	45·06	44·99	45·00	44·04	47·05	44·90	43·96
42·17	.....	37·40	.....	39·35	39·70	40·00	.....

COTTONSEED :—

Poona (Prof. Gadgil.)	Mr. Kembhavi.	Mr. Pandit.	Dhabhoi.	Manjri Farm.
21·11	18·50	18·05	18·20	16·80

Dharwar Farm—continued.

TILSEED :—

Sholapur.	Nagar.	Dharwar.	Khandesh (Havri).	K. Kathli.	Dharwar.
White ... 53·29 46·37	54·47 45·50	Brown ... 53·90 45·89	51·69 47·85 48·76 White. 48·44 Brown. 45·10 White. 45·85 Brown.	53·31 48·48 45·58 48·00 48·30	56·93 Black. 44·75 „

TILSEED :—

Dhulia Farm.

Khandesh (Black).	Khandesh (red).	Kanara.		Nasik.		Jalgaum.
		Black.	White.	Black.	White.	White.
50·09	54·77	52·42 50·28 41·45	44·87 46·98 41·65	45·99	49·16 49·21	43·44 46·10 .....

Surat Farm.

Kanara.		Sholapur.	Nagar.	Dharwar.		Surat.			Deshi.	
Black.	White.	Black.	White.	Black.	White	Black.	White.	Red.	4-Celled.	6-Cel.
46·87	54·20	52·13	54·02	54·41	52·95	49·59	50·46	55·08	45·83 55·14 44·15	50·20 54·08 47·30

Nadiad Farm.

Khandesh.			Kanara.		Nadiad.			Dharwar.		Nagar.	Sholapur.
Black.	White.	Red.	Black.	White.	Black.	White.	Red.	Black.	White.	White.	White.
52·83	49·80 51·05	54·03 ...	49·73 49·13 49·77 52·95 52·60	55·50 51·90 47·30 37·90 52·46	50·13 52·04 50·30 56·23 49·30	57·17 49·22 53·01 47·25 ...	55·45 49·64	53·07 46·04 49·47 47·80 ...	57·68 47·19 49·23 41·75 50·29	58·20 49·62 49·24 46·50 ...	56·29 51·95 50·83 39·10 52·28

Baroda (White).
47·96
47·86

Dharwar Farm.

Nagar.	Sirsi.	Dharwar.			Dhulia.	Baroda.	Surat.	Kanara.
White.		White.	Brown.	Black.	Havri.		Brown.	White.
56·89 55·62 48·62 47·70 51·65	46·86 50·94	51·07 52·56 50·25 42·15 48·40	45·74 49·50	55·22 51·96 51·37 46·60 48·20	49·27 50·85 41·25 46·50 ...	52·90 52·57	51·65 54·74	57·03 53·87 49·10 45·75 52·25

Sholapur.	Ranebennur.	Dharwar (Cabra).
46·44 47·16 51·08 44·70 48·15	49·91 42·20 (black). 47·55 („)	53·52 42·20 (red). ....

From Sind.

Sarreh (rap.).	Jambho.	Dhania.	Cottonseed.
45·60 43·85 44·25 42·06 43·36	35·75 32·66 34·37 33·28 34·76	23·90 19·73 22·49 22·73 20·23	20·55 18·63 21·11 19·25 18·05

CHAPTER IV.

Methods in use.

We shall now proceed to describe the *various methods in use* in crushing out the seeds. Taking for example the case of a common seed, the linseed, we can shortly notice the various processes it has to pass through.

Linseed is grown mostly in Rajputana, Malva, Sind, Central Provinces, Sholapur, Bijapur and other parts of Southern Maratha Country.

The preliminary process of removing the seeds from the husk consists in the uprooting of the plants at harvesting time; after drying them in the sun for several days these are spread on the threshing-floor and the pods removed by allowing country carts to pass over them. The leaves are separated by winnowing, *i. e.*, by throwing the pods in the air on a windy day, from a wooden country shovel, so that the chaff is carried away by the wind.

The seeds thus obtained are further strained in a big country sieve or in a wire frame to remove extraneous matter, such as dust, iron pieces, etc. This process is invariably resorted to by common *telis*. The seeds thus obtained can be treated for expression according to any of the following processes :—

Indigenous Methods of Expression.

1. A country *ghani* consists of a wooden mortar, rather raised, in which a long wooden pestle works ; at the other end is a wooden plate in which another piece of wood hangs, carrying a heavy weight, usually in the form of a stone. The principle on which it works is that of the lever and fulcrum. A bullock or, a camel as in Sind, or as in parts of the Jamnagar State in Káthiáwár, is yoked to a cross-piece attached to the wooden pestle. The pestle revolves by the animal going in a circle round the fixed mortar. There are two types of these *ghanis*—Wantagana *ghani* and Jodgana *ghani*. Wantagana *ghani* is drawn by one bullock only. It has a hole at the bottom to allow the oil to flow out. When sufficient oil comes out, the oil is heated and put into the *ghani* again. It is allowed to remain there for some time and then allowed to flow into the vessel below. The Jodgana *ghani* has a structure similar to above, but it has *no hole at the bottom.* It requires two bullocks. As the pestle moves, the oil is separated and collected at the bottom. When sufficient oil collects, the pestle is taken out and the oil is removed by means of a piece of cloth. Any kind of seed, except castor, can be worked here. The castor-seed is required to be boiled first before extracting oil from it. The oil by this method is cold-drawn and hence best adapted for culinary purposes.

2. Rotary *ghani* or improved *ghani* in which the mortar and pestle of the former method are made of iron and in which both are rotated by means of an oil engine. The principle is just the same as in the first process. The seeds can be pressed cold as well as hot. The only difference in the two methods is that the yield of oil and the output in the rotary *ghani* are much greater but the repair charges are very heavy. Hence the working expenses are lower in the country *ghani.*

In castor crushing by means of *ghani* the seed cannot be worked cold. The seed first requires to be boiled and heated and then put in the *ghani.*

3. Another method that is to be noticed in some places in the Presidency is the *hand screw press,* in which the measured quantity of crushed seeds is packed in press cloth and placed between the warm plates, about 25 in number, which bend vertically on to a long horizontal iron rod ending in a screw at one end. The other side of the rod is fixed to a winch which is turned by the application of manual labour at the end of a lever in the form of a long piece of wood. The screw-end goes in a fixed nut. The plates are heated in order to facilitate the expression of oil from the crushed seed, by means of a long movable furnace. When the screw is turned, oil flows in the tin trough at the bottom and then into a tank kept either in the middle or at the end of the press. The oil obtained is dirty as most of the fragments fall on the plates and as some impure matter goes

into the tanks. The oil is either filtered or allowed to settle. The cake is almost as hard as hydraulic press cake.

4. According to the "*Premier*" *Press Method* the seeds are pressed cold in a machine after crushing and the cake so obtained is ground in a roller. The ground cake is then subjected to steam for the second expression. The cold-drawn oil can be used for edible purposes while the second lot obtained can be used for commercial purposes. In this way the yield of oil can be increased and at the same time part of it can be very well used for edible purposes.

5. In the *Anglo-American Press Method* the crushed seeds are pressed hot. For this the crushed seeds are conveyed by means of elevators from the roller mill into a kettle, in which the seed is heated by means of steam. By this heating of the seeds the oily tissue in them is softened and the oil is made more fluid, thus facilitating the flow of oil by small pressure.

From the kettle by a mechanical device a measured quantity of heated seed falls into the moulding machine-box. From this box the seed falls on to the press cloth in the shape of the cake desired. The cakes thus prepared are placed in the press which consists of about sixteen iron plates. The ram is driven upwards by a hydraulic or oil-pressure pump or by accumulators when the press is full of cakes. The oil then flows from the seeds and collects into a tank below. After the flow of oil slackens, the pressure is released and the soft edges of the cakes trimmed off. These should be again pressed as they contain a large quantity of oil, while the remaining hard cakes are broken in a special machine called the cake-mill or grinder and are exported as such.

Seeds can be cold-pressed, but this process is difficult of application in case of those seeds which contain a very large percentage of oil, as a good deal of the oily matter is apt to escape through the cloth, and therefore the *cage process* is resorted to. In this process the press is provided with a circular box or cage to pack the seeds in the box. This box is either constructed of vertical steel bars, held together by a number of rings, or consists of a cylinder having a large number of perforations. Such presses are usually worked in sets of two or three or more and have a kettle fixed on the top of the press. The kettle has an opening or openings corresponding to the chambers in the heads of the presses. These chambers can be closed at the top and bottom by the slides with the help of levers and contain meal enough to form one cake. When the whole press is filled the oil flows out on application of pressure. After releasing the pressure the cakes are removed and broken into meal. This can be subjected to a second expression in the Anglo-American press described above, or the preliminary press is combined with the second finishing press. The cage itself can be removed by means of machinery to the finishing press for second expression. Thus the process can be made a continuous one.

6. The expeller or oil press is a massive machine designed to extract the oil from the whole seed. The seed is fed into the right hand end of the machine and, as the screw revolves (about 14 times per minute), the seed is carried forward by the screw and crushed against the side of the barrel as it moves towards the discharge at the left hand end. At this end the cone-shaped plug partially obstructs the opening and a heavy pressure (about 8,000 pounds to the square inch) is required to force the seed or cake out between the plug and the side of the barrel. This pressure is sufficient to "expel" or force the oil through the small openings between the staves and it runs out to a settling tank under the machine. The cake is forced out in a sheet at the left hand end, and is handled from there in an ordinary conveyor. The oil and the cake come out continuously so long as seed is fed into the machine.

The expeller regulates the feed itself and the seed chute to it can be kept full of seed all the time.

After the expeller is started and gets warmed up (the friction heats the seed to about 140° in passing through the machine) it requires no attention, except to keep bearings lubricated. It is continuous in operation; there is no "charging" to be done and no time lost while it "drips" as in a hydraulic press. There are

other advantages over the American press method, in that the cakes require no paring, and that there is a saving in the press cloth.

There is another process of removing oil from the seeds. The above described are physical processes, while there are others to extract oil by chemical methods. Here too there can be hot and cold extractions in two ways. The chemicals used are solvents, *i e.*, those which dissolve oil from the crushed seeds and at the same time precipitate the colouring matters. Thus the oils obtained by extraction are highly coloured. The common solvents are ether, carbon bi-sulphide petroleum, petroleum-ether and the last but the most important is the tetrachloride of carbon The great advantage of tetracholoride over all is that it is not inflammable but the greatest drawback even in this solvent is that it has a very injurious effect on the health of the working people, *i. e.*, the same effect as that of chloroform. By this chemical process no doubt all the theoretical quantity of oil can be extracted but then the cake comes out in the form of meal which cannot be used profitably as a cattle food. It can only be used as manure.

Uses of oil.—Linseed oil is used for edible purposes by natives in some parts of India when cold-pressed. It is also used for burning. But the main use of linseed oil is for paints; for producing drying oil it is boiled previously. It is used also in the manufacture of vulcanised oils or for extracting India rubber from waste rubber. It is thus used for linoleum, asphaltum, etc. Raw oil is used for the preserving of wood by covering it with oil. The seeds at present are exported to foreign countries where the oil is used in paints and varnishes for importing them here also Its cake is used as cattle and horse food for the most part as well as for manurial purposes.

Castor-seed.—This grows all over the Presidency and mostly in Gujarat. The seeds are as big as peas and contain a large quantity of oil. The seeds which contain about 20 per cent. husks and 80 per cent. kernels are either pressed undecorticated or decorticated. The oil is so thick that it is easily pressed only on heating. Medicinal oil is best expressed when cold.

All the different methods given under linseed can be used here. In the common *ghani* method the seeds are first cleared of shells and then boiled with water, when some of the oil floats at the top of the water. The oil thus obtained is separately decanted while the seeds when still hot are pressed in the *ghani*. The same is the process in the Rotary *ghani*. The percentage of oil in the seeds is about 40 to 46 per cent.

In the winter season here cold expression is quite out of the question as the oil becomes thick and the cells contracted prevent the flow of oil.

The uses to which the oil is put are manifold.

It is used for opening the bowels in medicine when cold-pressed. It forms a very good lubricant and is used as such in many mills and locomotives. It is used as a preservative for leather, for the manufacture of Turkey Red oils, celluloid and soaps. Many hair oils contain it as an adulterant. The poor classes use it as an illuminant.

The only use of the cake is in the manure; it cannot be used as a cattle food as it has a very poisonous effect on them. The castor cake is very rich as a fertilising constituent, so much so that it might pay to grow castor-seed simply for manurial purposes. It is also used as fuel, for caulking timber and also for doing away with the white ants. There is a complaint outside India about the deterioration in quality of castor-seed and hence attention must be drawn to improve its cultivation.

Rape-seed.—These are grown mainly in Gujarat and Sind. They also yield a drying oil as linseed oil and are expressed and treated according to the same methods as linseed.

The oil percentage of rape-seed is 42 to 45 per cent. The various uses of this oil are for edible purposes and lubricating purposes both as refined oil and "blown" rape oil. It is made use of in preserving pickles and also for skin application. Rape oil, being a drying oil, is used for paint and varnish manufacture and also as an adulterant in mineral oils.

The cake is used for manure and cattle food—a good deal in U. P. In this case the cold-pressed oil is much purer than the hydraulic-pressed oil as the latter contains some mucilaginous matter.

Safflower.—Safflower is mainly grown in Bijapur, Belgaum, Dharwar and Ahmednagar Districts. The seeds contain 30 to 32 per cent. of oil. On account of the thick husk only about 24 per cent. of oil is obtainable by pressing. Generally, the seeds are decorticated first, so as to lay bare the kernel which forms nearly 50 per cent. of the seed. A stone grinding mill is used by *telis* to remove the husk, which is removed only completely after grinding and re-grinding several times. It is expressed in the same way as the linseed. The oil is pale yellow. Considerable quantities of this seed are pressed either singly or mixed with other seeds, chiefly, niger, groundnut or sesame.

Safflower oil has good drying powers, and although it cannot replace linseed oil in all its applications, it should certainly form a substitute for it in many instances, and find extended use in the manufacture of soft soap.

Groundnut.—Groundnut is cultivated largely in Sholapur, Dharwar, Belgaum and other Southern Maratha Districts. The seeds are largely exported to Bombay. They contain nearly 40 to 48 per cent. of oil. The cold-pressed oil is largely used for culinary purposes. Groundnut cakes make an excellent cattle food. They contain the highest amount of proteins of all known oil-cakes; moreover, these proteins are more easily digested than those of other cakes. The cakes from undecorticated nuts contain about 5·35 per cent. of nitrogen and 0·9 per cent. of phosphoric acid; those from decorticated nuts contain 7·9 per cent. of nitrogen and 1·35 per cent. of phosphoric acid.

Sesame.—Sesame oil is extracted from the seeds of the sesame plant. Two chief varieties of this seed are known in this Presidency—the white one yielding the best oil and the black one containing the largest percentage of oil. It is grown almost everywhere in the Bombay Presidency, notably in Gujarat. The oil has great demand everywhere in the Bombay Presidency.

The oil from the hydraulic presses fetches less price as the heat at the time of pressing injures the quality of oil.

The oil is used mainly as an edible oil. A small quantity is used only in the production of perfumes ("enfleurage").

The cake forms an excellent cattle food. In Sind it is used in confectionery.

Poppy-seed.—Poppy-seed oil is obtained from the seeds of *Papaver somniferum.* The best qualities of oil are used for edible purposes, and also for the preparation of finest paints for artists.

The cake resulting as a bye-product is rich in nitrogen and is given to cattle; only when the cakes have become mouldy, are they employed as a manure for early fruit.

Niger-seed.—Niger-seed oil is obtained from the seeds of the plant (*Guizotia Abyssinica*). It is largely pressed in the Nasik District. In other districts it is generally mixed with safflower or groundnut before pressing. The seeds contain from 35 to 37 per cent. of oil. The seeds are small, have a pointed shape, and are shining black in colour. The oil is extracted in the same way as that of linseed, groundnut or sesame.

Hemp-seed.—Hemp-seed oil is obtained from the seeds of the hemp plant (*Cannabis sativa*). The seeds yield about 30 per cent. of oil. The colour of the freshly expressed oil is light green to greenish yellow, becoming brownish yellow on keeping.

Mowra-seed.—Mowra-seed oil is obtained from the plant (*Bassica latifolia*). The oil is solid at the ordinary temperature. It is used in place of tallow where religious tenets forbid the use of the latter. The seed contains about 50 per cent. of oil. The mowra-seed cakes are poisonous and can only be used as manure or fuel.

Kokum.—Kokum fat is obtained from the seeds of the tree Mangostana Indica. The seeds contain about 25 per cent. of fat. The fat is prepared in Ratnagiri and Karwar Districts. It is prepared in a primitive fashion, by drying the seeds in the sun and boiling them out with water. The fat is then skimmed off, filtered in a crude fashion and cast into round cakes. It is used as an edible fat. It is also employed for the adulteration of ghee. It is also used in pharmacy for ointments, etc.

There are two oil-seeds, namely Jambho and Sarreh, which are indigenous to Sind only. They are not found anywhere in the Presidency; both the seeds are worked in a country wooden ghani taking about 14 lbs. at a time. In the case of Jambho some fibrous material like straw is mixed with it in every ghani to increase the quantity of oil.

The ghani is of the ordinary country ghani type with the only difference that one camel is used to drive it instead of bullocks.

Uses of oil.—The oil is used for lighting, as hair oil by the poor classes and for frying and for application to camels when affected with rheumatism and to cows when suffering from colic. When applied to the skin, it produces irritation. The cake is used as a cattle food.

Sarreh oil.—The seed is worked the same way as Jambho but the oil is much better in quality than the Jambho oil. It has not the bitter taste of Jambho. It is put to the same use as Jambho but it is used also for smearing the eyes of children. The cake is not much used as cattle food. The Government can encourage the oil industry in this part by instructing the agricultural experimental stations to show the decided advantages of feeding the cattle with oil-cakes instead of oil-seeds. This is the greatest advantage that the Government can give to the oil millowners. For, it is the cake which forms the main portion of the oil product which is difficult to dispose off locally and on which the success of the factory mainly depends. The Government can also ask the stations to show the comparative values of cake manures as against the other artificial manures.

The following is the approximate percentage of oils we get from different seeds :—

	Name of Seed.	Chemical Percentage.	Actually we get p. c.
1.	Cottonseed	18-20 per cent.	12-14 per cent.
2.	Rape	40-45 „	36-40 „
3.	Linseed	42-44 „	34-38 „
4.	Castor	46-50 „	40-42 „
5.	Tilseed	50-55 „	40-45 „
6.	Niger	35-37 „	28-32 „
7.	Safflower	30-32 „	20-25 „
8.	Groundnut	44-50 „	38-42 „
9.	Mowra	50-55 „	45-50 „
10.	Cocoanut	65-70 „	60-64 „
11.	Dhupa	26-30 „	20-25 „
12.	Jambho	45-47 „	38-40 „
13.	Poppy	45-50 „	35-40 „

Let us point out here how far improved ghanis have come into use. In the course of my tour I found them in use, *e.g.*, in the Northern Division at Billimora, Petlad, Bulsar; in the Central Division around Bombay itself where quite a number of them do exist—and a good many on the south-east of the G. I. P. line, for example at Dhond, Barsi and Sholapur. In the Southern Division they are to be found in use in Belgaum and Hubli. In Sind a number are to be found in Karachi and Hyderabad but in the northernmost part of Sind they are quite rare. On the whole, one can say that for every hundred old-fashioned bullock ghanis one can meet about ten of the slightly modern rotary power ghanis. The crushing capacity of a rotary power ghani is about 500 lbs. per day and that of an ordinary ghani driven by a bullock is about 60 lbs. per day.

TABLE.

Name of District.	Approximate number of ghanis in Districts.
Ahmedabad	600
Broach	200
Ahmednagar	700
Bijapur	700
Sholapur	1,200
Poona	200
Nasik	300
West Khandesh	250
Dharwar	400
Belgaum	250
Karwar	150
Ratnagiri	200
Kolaba	50
Surat	250
Kaira	150
Sind	700
	6,300

Extent to which power of various kinds is used.—In the whole Presidency, as regards the rotary power ghanis, they are either driven by steam power or oil engines. Steam, of course, is used in most of the hydraulic presses which are erected in the bigger mofussil towns such as at Navsari, Broach, Baroda, Thasra, Petlad, Sidhpur; in the Central Division excluding Bombay of course, steam power is hardly used to any appreciable extent. Similar is the case with the Southern Division. In Bombay and Ahmedabad the number of mills using steam power is about ten. As regards the use of oil engines all smaller concerns, using power rotary ghanis, find it cheaper and convenient to utilise oil engine power. Of such smaller concerns, many are in Bombay, Ahmedabad, Dhond, Sholapur, Hubli, Belgaum and Nasik.

As regards Sind, Karachi and Hyderabad have oil-driven plants and that seems to be the rule with the exception of one concern in Karachi which uses steam.

Of course the power used for driving the indigenous ghani is animal power, namely, that of bullocks chiefly and at some places camels and of buffalos. It must be noted, of course, that in some cases asses also have been used.

CHAPTER V.

We have in the foregoing chapters considered the oil industry specially with reference to the supply of raw materials at hand in Western India. We have also touched largely upon the question of the various methods in use in that industry. *We shall now consider what is the present productivity of oil producing plants in the Bombay Presidency touching upon the methods in vogue.*

As we have already said, the chief methods of oil production are the hydraulic, the expeller, the rotary and the ordinary ghani method. The total output per day of the concerns using hydraulic process is at the highest 100 tons seed crushed.

The expeller methods yield in all about 25 tons per day. Now remain the rotary and the ordinary ghani methods for consideration. The total output per day from the rotary method is about 30 tons per day. It is difficult to give approximate figures even, as to the total output per day, of all the ghanis in the Bombay Presidency, because it is practically impossible to obtain from each individual Teli the figures of his day's yield, but we can put it with some approach to accuracy at about 125 tons per day from different oil-seeds. Thus we notice that the crude indigenous method still produces the largest number of tons per day but this superiority in numbers will soon decrease because the cost of production per ton according to that method is heavier than any other, quite apart from the amount of time lost.

We shall realise better the difference between the modern methods and the indigenous methods of production both as regards the output in time and yield by taking up for detailed consideration any particular area where the indigenous ghani method is in great vogue or rather is the only one in use. We can then estimate what difference will be produced in the output if the old method is replaced by the machinery one.

Let us, for example, take a district like West Khandesh where the sesamum seed had an yield in 1911-1912 of 4,062 tons from an area of 42,494 acres. This means that on an average 10 acres were required to produce one ton of til or sesamum seed. We may note here that this is found to be the best average when compared with other districts where for the production of one ton anything from 13 to 15 acres are required. Even as it is, if the suggestions I shall make later on were followed, the same area of 10 acres in a district like West Khandesh could be induced to yield much more than merely one ton of sesamum. Now, working according to the old lines the average Teli can have per day an output of about a hundred pounds of seed. Thus it takes 22 days to crush one ton of sesamum. Now we must consider his cost of production per day. He generally employs either one or two bullocks and keeps one hired man. But then he is helped also by grown-up members of his family who then cannot be spared for going out for employment elsewhere and getting an independent living. Suppose he were to spend, as he generally does, annas eight per day for the maintenance of his bullock. He has to pay annas six per day to the hired man and we are bound to add to his expenditure another four annas a day as something which he would have been obliged to pay if he could not have had the help of his family. We are not taking into consideration the outlay he has made upon buying the ghani or the bullock. Also he has practically nothing to pay for rent because very often he lives in what can only be called an apology for a house. Thus his cost of production per day is annas eighteen only. Now as he has to spend 22 days in crushing one ton, the total cost of production in his case will be Rs. 24-12-0 per ton. One ghani working throughout the year, barring holidays, can produce only 15 tons during the time as the manufacture of one ton requires for a ghani full 20 days. Let us suppose now that a factory using the hydraulic process is established in such a sesamum producing area like West Khandesh; in this case, unfortunately it is not of any economic utility to use the hydraulic process because experience has shown us that this process applied to sesamum crushing yields a poorer grade of oil than ghani manufacture, because during the heating process the colouring matter precipitates in the oil and thus makes the oil darker.

However, as has been mentioned before, the cost of production per ton inclusive of everything is Rs. 15 when using the hydraulic process. Thus in the long run it is cheaper to resort to this method than the indigenous one. As regards the total output, practically the factory can produce during the course of one single day all that one ghani can produce during one whole year.

The cost of production in the expeller system of manufacture is still less. It is only Rs. 8-9-0 per ton, chiefly because in this case Press Cloth, the heavy item of expense in the hydraulic press, is done away with and also the expeller process requires the employment of a far less number of men than in the other method. Another point which reduces expenditure is that the little labour which is wanted need not be skilled, so long as it remains automatic. The Anderson oil expeller is the only kind of cold-press that has been developed. It is a continuous press, consisting essentially of a horizontal cylinder, built up of a series of longitudinal steel bars firmly bound together but with very fine cracks between the bars for the exudation of oil. A strong steel conveyor works inside the cylinder. Whole seed or decorticated meats are fed in at one end and forced by the conveyor against a conical plug at the other end. This plug may be adjusted in and out to regulate the size of the annular opening, thus regulating the pressure exerted on the meats. Oil flows out between the cracks in the cylinder wall and the dry cake is forced through the annular opening at the end in the form of spiral shavings an eighth to a quarter of an inch thick. The oil thus obtained, while nominally cold-pressed, is in fact considerably heated by the friction of the apparatus as now worked, *i.e.*, with the intention of getting out in one operation as much oil as would be obtained by the hydraulic pressure. We need not consider here the cost of production of the power-driven rotary ghanis, because they are after all only an improvement upon ghanis and cannot bear competition in output with the other methods. But one great advantage of the old method must not be lost sight of. The local Teli is always sure of his market, though the market may not extend beyond his own village. It is only in mofussil towns like Bijapur, Ahmednagar or Hubli that the Telis have understood the usefulness of running under one control so many as 40 to 50 ghanis and shipping the oil produced to Bombay. But these are exceptional cases. The chief market for a Teli is his own neighbourhood. The Teli is also under no difficulty as to the disposal of the most important product in his industry, *viz.* cake. Thanks to the deep-rooted belief in the mind of the ordinary ryot that the Teli's cake is far more nutritious for his cattle because it contains much more oil than cake manufactured by modern methods. The Teli's cake is sold as quickly as produced. It might be interesting to the modern capitalist if we mention here another pecuilar belief of the ryot and this is, his preference for the particular form in which the Teli manufactures his cake. If the mills try to sell him in the form of flat slabs, he will have none of it. It is as well that the millowners should try to educate the ryot and make him realise that cake from his mill though different in form and containing less oil is as nutritious as the Teli's cake, because the great point is, that for cattle nutrition the material should not contain less than 7 per cent. of fat producing material, and as for manurial purposes it is more economical to utilise cake from mills which can be had cheaper as it contains less valuable material in the form of oil. The Teli's cake when used for manure means really an economic loss, and inasmuch as oil in it is of no value at all for manure it is absolutely wasted. Having the demand for his products at his very door and not being bothered with any question of storage and consequent damage through deterioration, the Teli has no railway freights to pay either for his bye-products or for his finished material. Neither has he got to build storage sheds. He does not incur railway freights for his bye-products because he is right in the centre of seed producing area, nor has he to send his finished material to any distant place of consumption because all his buyers are local. Shipping oil is not in his line unless he has learnt some cooperation.

As in the seed producing areas modern methods of manufacture will come into use, it will not be possible for the local Teli to exist in a flourishing condition but we must look to the other side of the picture and we must not fail to notice that in particular circumstances it will not be possible to start a modern oil-pressing concern, even in a seed growing area. Such a concern will have to calculate accurately the question of constant supply of labour, of regular facilities for cheap transport and the possibility of working either all the time or storing the material.

And it is in such areas that the local Teli, unconcerned with such difficulties, will still thrive. Other centres where his existence is still happily assured will be remote villages not accessible to any regular means of communication, this latter fact of course preventing the possibility of the local seed crop being easily exported. It might of course be possible to improve the present condition of the Telis. I shall make later on some definite suggestions, which I hope will be found capable of practical application. It would be a pity indeed if such a painstaking and industrious class of workers were to succumb to modern machinery, but as a matter of fact it is not likely that the Teli will find his profession gone for many years to come. The Government can encourage oil industry by preventing the export of the oil-seeds by levying a heavy duty on the seeds exported, by asking the railway authorities to reduce the mileage rates for oil-seeds and their products. If the Government ask the Municipalities to give some concessions to the mills only in their infancy, a sort of bounty in the form of reduction of taxes, and to maintain the roads to the mills in good state so that the traffic to the mills might not be hampered, the oil industry should receive a further encouragement.

The seed merchants can co-operate with the factory owners on the understanding that no raw material in the form of oil bearing seeds are to be exported and the factory owners might make an agreement with them in return to export the products through the seed merchants who have joined the society.

Cotton-seed oil mills have not been established on a large scale owing to the non-enterprising nature of the Indian capitalists. The Indian capitalist generally will only invest in the concerns that have proved a success and not in new prospective concerns. At present the failures of some of the oil mills already stated owing to some cause or other have damped the enterprising spirit of some capitalists who would otherwise have started new oil mills. In order to promote the cotton-seed oil industry, the export of the cotton-seed to foreign countries ought to be restricted and all possible facilities be given to those mills crushing the seeds in this country. It is quite essential to back the new industry till the first stage of infancy is over. The Government should start some experimental oil mills in the oil-seed growing areas and sell them off to the public after the concerns have been shown to be paying. The oil mills should be started just near the ginning factories in order to avoid cartage from the ginnery to the oil mills thereby saving so much expense on the price of the cotton-seeds.

CHAPTER VI.

DETAILED CONSIDERATION OF COTTON-SEED OIL.

Cotton-seed Oil.

Even from ancient times cotton-seed oil has been quite familiar to the Indian. The old medical books of the Hindus mention the importance of the cotton-seed oil for external applications and the method is described of extracting it out of cotton-seed. That method, which mainly consisted of first pounding the seeds and then boiling the pounded contents, produced an extremely crude oil. The liquid matter that floated about was used as the cotton-seed oil. Beyond that the Indians have never travelled, but in China some progress was made in crushing the cotton-seed rapidly and the Chinese have made some great attempts at refining.

It could not fail to strike even the most ordinary enquirer into the possibilities of the Oil Pressing Industry in India that the utilising of the cotton-seed presents a good many fertile problems of enquiry. Unfortunately the Indian capitalist, who ventured to start oil pressing concerns in the Bombay Presidency, never devoted any detailed attention to the possibility of the cotton-seed mainly because he thought that refining the cotton-seed oil was a problem beyond his efforts. But we hope to shew its possibility to start refinery works with a margin of profit if the best American methods are used and care is taken to avoid the waste.

Only four factories on the European methods were started to date, out of which unfortunately for the industry most of them have failed owing to one reason or another. Had the factories been started with the previous foresight before locating them in the present sites, this calamity could have been partially averted. It is not only the loss of money invested in the concerns under review to the public but this has a far reaching effect on the enterprising spirit recently developed in the timid investors of the Presidency. It is only the money locked up in ornaments or in Government papers that was finding its way in the rising Joint Stock Companies. But the failure of these Companies has for some more time to come sealed the fate of the cotton-seed oil industry. It is no doubt very promising only if all the precautions necessary for its starting are well studied and followed.

It will be advantageous to the public at large to know the causes of failure of these mills in order to know the bright prospects for the cotton-seed industry in spite of these failures. I will also give the necessary precautions that should be taken before starting any cotton-seed of oil factory.

I take the failed factories one by one :—

Broach.—The Broach factory was a joint stock company, the managing agents of which were one Vakil (a very enterprising sort of a man) and the other, a Marwari. No doubt the Marwari would have made a good Managing Agent and a Financier had he been rather informed about the details of the working of the oil mill machinery or had he been fortunate in securing an expert as the partner. But the other agent too was quite ignorant of the business he was to manage. It is rather the unhappy lot of India that the managing agents of the majority of joint stock companies except of the Textile Mills or even of private concerns are men least informed of the lines they are required to manage. In very many cases the agents show very little interest beyond the commission which is their hereditary privilege. All these things are allowed to pass in India without the least notice being taken of it simply because the people are rather backward in point of information. These are the main causes of failures of many of the industries in general. There is also another side of the problem. The managers of the different concerns are not only unable to help the industries committed to their custody but lack the most essential qualities of a Manager. They always are in *status quo.* They never seem to be progressing or moving with the advancement of the time that is taking place in other parts of the world by strides and bounds.

The Managers require the regular training of the time and also the efficient management of the business from a commercial point. In other words it is not quite enough for a manager to know the working of the machinery but also he should be a thorough business man.

To continue about the Broach Mill which was situated on the main road leading to the town proper. The site was not well selected as it was far from the station, there being no local demand. If the oil market is right in the town, the site may be further; otherwise, if the bye-products are supposed to be exported, it must be nearer the station. The machinery was quite deficient and not of the right type. It gave the managers a lot of trouble in working. Besides, in the cotton-seed oil factory the expert refiner, who is quite essential for successful working, was not to be found here. There was no refiner worth the name. It is always the refiner that is responsible not only for the good refining of the crude oil with the minimum loss of oil in the process but also for the efficient pressing of the oil-seeds. It is always a great drawback with the managers of the oil factories in general that they ran a concern with very deficient financial arrangements, and the Broach Mill Managers were not free from the charge. Last but not the least important cause of the failure was the disagreement between the partners themselves who finally sealed the fate of the mill. As report goes, the managers were misguided in the choice of machinery, also they could not find y ers for bye-products.

Baroda.—Let us now turn to the Shri Sayaji Cotton-seed Oil Mill at Baroda. The same defects of the wrong selection of site and the inefficient financial arrangements were found in the case of this mill also. The seeds were pressed undecorticated and hence the oil obtained contained a great amount of foreign matter which rendered the refining rather difficult. Over and above defective refining, the crude oil yield was very low.

Kurla.—The cotton-seed oil mill situated at Kurla was no doubt well managed and there was no question about the best financial arrangements, the proprietors being the greatest business men to be found in the whole of our country to say the least. The seed storing arrangements seemed to be very defective. The seed deteriorated in large quantities which subsequently caused off oil at the time of refining. Most of the machinery imported was second-hand.

The only great disadvantage in all the cotton-seed oil mills up to now started is that the working capacity was very small. For a successful working of the cotton-seed oil mill, the minimum capacity should be about 20 tons a day. When the capacity is below 20 tons, if good hands are employed (without which the products will be unmarketable), the working expenses will be very high. But if the working capacity is so kept that experts can be employed, not only will the products be good in quality that can be easily sold in the market but the yield of the oil will also be much higher and the loss of refining very much less. This forms a big item in the daily output which rather goes a great way in the successful working of the factory.

Cotton-seed oil.—India stands second as the cotton-producing country in the world. Cotton stands prominent among farm crops in the country and is remarkable for the cheapness of its production as compared with the variety and value of its products. It is a most useful plant and all its components are made use of.

The machines absolutely essential in a hydraulic mill are Seed Cleaner, Linters, Hullers, Separating Reels, Beaters and Shakers, Stack of Rolls, Cookers, Former, Presses, Hydraulic pumps, Cake Breaker and Cake Mill. The seed is run through the Cleaner to the Linters, from the Linters to the Huller where it is cut up, then the separating machinery takes out most of the meats, leaving the hulls in the shape in which they are marketed. The meats are run through a stack of chilled rolls to break the oil cells, then put in the Cookers and by means of steam are cooked 18 to 30 minutes. The cooked meats are put in the former where they are pressed into shape and wrapped in press cloth by hand. The wrapped cakes are then put in the press by hand and the pump started; this "charge" is left in the press about 20 minutes and the pump is stopped. The cakes are then taken out of the press and stripped of the cloth by hand and piled up to cool, after which they are fed in the cake breaker by hand and ground up into meal.

The histories of cotton, cotton-seed and cotton-seed oil are entirely separate and distinct. The cotton plant and the use of the cotton fiber for weaving into cloth has been known for thousands of years, while the utilisation of the seed for various economic purposes is of very recent date. Careful cultivation is necessary to the proper development of the plant. The cotton plant is not a hardy plant. It is very sensitive to climatic changes.

The utilisation of cotton-seed in the manufacture of oil and other economic products has added a great deal to the value of the cotton crop and the steps in the growth of the industry are of interest. For a long time the Chinese have ground cotton-seed for cattle feed, and incidentally recovered a little crude oil which was used for illuminating and lubricating purposes. The first authentic record of the extraction of oil from cotton-seed in the West was in 1783, when seed from the West Indies was pressed in London with such satisfactory results that a prize was offered by the Society for the Promotion of Commerce and Arts to any planter in the British West Indies who should express a ton of oil from the seed and make 5 hundredweights of dry, hard cake fit for cattle food.

The manufacture of cotton-seed oil on a large scale may be said to date from about 1870.

The United States of America have outstripped the other countries both in the quantity and the quality of cotton-seed oil produced. The advantage that the "States" enjoy over others is in obtaining their raw material in a fresh state while the other millers are obliged to use mostly Egyptian and Indian seed which has suffered a long period of transportation. There is no mill in England which manufactures edible cotton-seed oil as the shipment of American and Indian seed to England meets with rather poor success owing to its bulk and great tendency to heat during transportation, which counteract other advantages. England produces only commercial quality of oil for soap-making, etc.

Formerly the object of the oil mill owner was to recover the two principal products, oil and cake only, but through scientific chemical investigation it has become possible to recover many valuable bye-products from what was once waste. The tendency now is to concentrate under one management the handling of all products of the seed. It is common for cotton-seed oil refineries to work up their foots into various grades of soap, to recover stearin, to manufacture lard, butterine and other edible products. The demand for cotton-seed oil is on the increase and the prejudice aganist its use as an edible oil has been largely overcome.

The field of the chemist in the cotton-seed oil industry is broad and inviting. New possibilities for development are constantly coming up. In the mill the application of chemistry in determining the grades of crude oil and the best uses to which it is adapted, and in indicating and correcting existing defects whereby better yields and better products are obtained, attests its paramount importance.

The most important requisite in the production of cotton-seed oil and its resultant cake at a profit is a modern, up-to-date equipment under intelligent and scientific direction. From the time of receiving the seed, through the various operations of cleaning, decorticating, crushing, cooking and pressing, careful and systematic working is necessary to produce high grade, marketable products.

The seed that has been trampled upon or partly crushed through handling is very prone to heat from oxidation of the exposed oil and increases the danger of deterioration in bulk of seed with which it is mixed and stored. The more modern plan is to divide the storage houses into different compartments, each holding a moderate amount of seed, thereby lessening the liability of heating and deterioration by reducing the bulk that is kept in one compartment. It is very important to keep the stored seed cool and dry and to have the storage houses provided with good ventilation.

Very recently a plant has been erected in Texas where the process of extracting the whole kernels from the cotton-seed is in operation. This is claimed to be the only one of its kind in existence. The kernels are abstracted by the combination of machinery and chemicals recently invented. The capacity of this plant is claimed to be 100 tons of cotton-seed daily. The husk-free kernels are mainly

exported at the present time, but if the process proves to be all that is claimed for it, it means a great advance in the whole cotton-seed industry. The clean kernels yield a high grade of oil and also a much greater porportion of oil than can be obtained from the usual decorticated seed. The residual cake, being free from the usual proportion of husk, contains an unusually high content of proteid matter.

The industrial uses of cotton-seed oil are very numerous and diversified. Its use is constantly being extended to new fields and there seems to be no limit apparent in its wide application as evidenced by the numerous inventions in which cotton-seed oil plays a part. Refined cotton-seed oil may be used for almost every purpose to which sweet oil is put except for household illumination and lubrication.

Cotton-seed oil is the purest form of soap stock that comes upon the market. The oil is made into various grades of soap, from low grade laundry soaps and washing powders to high grade toilet soaps.

The cotton-seed foots are made into soap stock, and subsequently soap. Cotton-seed foots when fresh are of a brownish colour but they rapidly become black upon exposure to the air. In some plants a crude system of pressing is resorted to for obtaining all the oil possible from the foots, which is an economical procedure, as there is always a wide difference in value between the foots and the oil. By the usual procedure, the free oil remaining in the foots may be saponified and thus a homogenous soap obtained. This is known as cotton-seed soap stock.

Cotton-seed oil free from mineral oil or wax is used by bleachers of cloth in a somewhat novel manner. If the goods are found to contain some off colour places or are spotted in any way, some cotton-seed oil is painted over the spots by means of a brush or sponge. A second treatment of the goods in the scouring and bleaching will then remove the off colour places and leave the goods an even white. The oil impregnates the fibre of the goods, softens the discolouring matter and renders it easy to remove.

For pharmaceutical purposes cotton-seed oil finds extensive use as a base for liniments, ointments and similar preparations in place of olive oil.

It is said that cotton-seed oil has a considerable outlet in the rubber industry. By adding 18 per cent. of crude rubber to this oil an imitation is formed which it is difficult to detect from genuine rubber. By the action of chloride of sulphur on cotton-seed oil, a viscous, sticky compound is obtained, which is the chief component of "factis" or artificial rubber.

Among other uses of cotton-seed oil are baths for tempering steel; in combination with other materials for preserving wood by saturation; for bolt-cutting and similar work; for canning fish, and for mixing with higher priced oils for sophistication to reduce their cost.

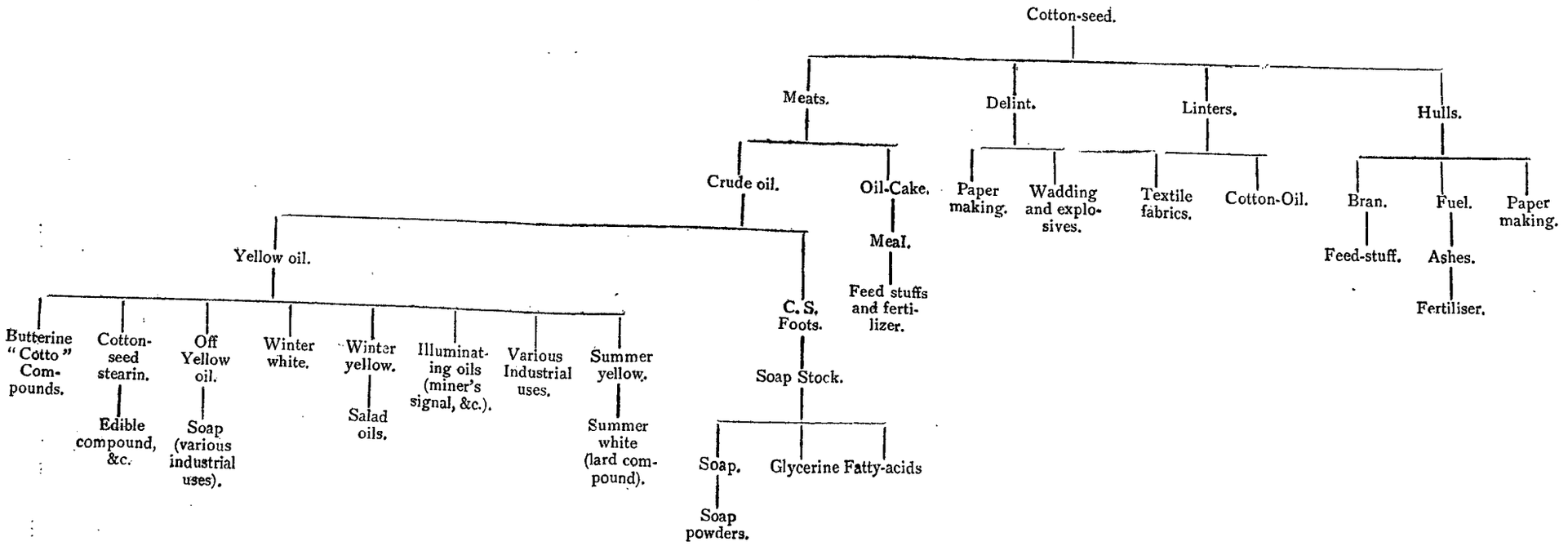
Cotton-seed feeding stuffs include ordinarily cotton-seed, cotton-seed cake or meal and cotton-seed hulls. Cotton-seed meal has met with great favor abroad for many years. It is the most concentrated, nutritious and one of the cheapest of ordinary feeds for cattle and sheep.

Numerous experiments have shown that cotton-seed meal produces in the same rations more and cheaper fat than the same amount of bájri or jowar fodder.

Analysis of Cotton-seed-Fertiliser Materials.

Materia	Moisture.	Ash.	trogen.	Phosphoric Acid.	Potash.
Cottôn-seed	8·42	3·78	3·13	1·27	1·17
" Meal ...	7·60	6·95	7·00	2·88	1·77
" Hulls ...	10·17	2·40	0·69	0·25	1·02
Hull Ashes	8·95	...	...	10·85	22·89

Chart showing the Bye-products of Cotton-Seed.



CHAPTER VII.

In the foregoing chapters we treated in detail the question of production of various kinds of oils by both the modern and the indigenous methods and we touched upon the possibilities of increasing the area of the oleaginous seeds in Western India. We have given a separate chapter to the treatment of Cottonseed oil which will be by far the most important product in the entire field of the oil pressing industry in Western India. I propose now *to point out some definite means by which the oil pressing industry in the Bombay Presidency can be developed on systematic lines and thus be put upon a sound footing.* We have to consider this question of securing the industry more favourable conditions from the following points of view.

We must first of all examine how much is possible for the Government to do generally to help the industry. We must consider what practical remedies lie in the hands of the big capitalists, the cotton ginners and the owners of large and small oil-pressing concerns. Next we must notice what is practicable for the Agricultural Department to achieve particularly in the direction of educating the ryots in understanding the value of using the right form of cake and other bye-products from the oil factory. The ryot must be made to understand that it is useless for his cattle to consume more than 7-8 per cent. of Carbo Hydrates. He is at present prejudiced against the use of cake from the oil crushing concerns and believes that his cattle can be better nourished on cotton seed whereas giving cotton seeds to his cattle is an economic waste. Moreover, by making any kind of cake pass through live cattle, he not only increases the milk-giving capacity of the beast but he obtains better manure for his fields. This statement is corroborated by a number of experiments on agricultural experimental farms. Let us now first turn to what the big capitalists, as also owners of ginning factories, can do. It is to the interest of the capitalist, of course, that he should be able to produce the oil at less cost, and the ginner will also lend his serious interest to any improvement which will avoid the necessity of exporting his cotton seed. If he is told that he can profitably utilise this cottonseed without any extra expense I am sure he will not be averse to follow all these suggestions. Now in every big ginning centre all the ginning factories are equipped with surplus horse power. This surplus horse power they can use in getting crude oil out of the cottonseed at hand. This presents practically no extra labour and no extra expense, especially as crushing out the cottonseed and turning same into crude oil will require very little power.

Supposing now the important ginning centres were to get their crude oil in this way, the owners of ginning factories can by the formation of a Ginners' Association establish a Central Refinery in their very midst. It will no longer be necessary then to ship the crude oil either to foreign ports or to big cities in India itself where Refineries might come to exist. Such Ginners' Associations exist in America and they have several Refineries under their control. Now, here is a case where the big capitalist in the city can co-operate with the ginner in the mofussil. If the export of crude oil to foreign parts is lessened, it will mean an additional material for the capitalist to work on. I do not know why there should not exist on this side of India a Central Oilseed Crushers' Association as in America. Such Associations in America have their Bureau of Publicity, the chief duty of which is to advertise all over the land the merits of the products and bye-products of the seeds that are crushed. It is found difficult for any individual owner to advertise freely the products of any particular seed and his expense increases his cost of production which correspondingly raises the prices of the seed product in the open market.

Nitrogenous products are being drained out of the country by way of export of cakes, raw seed, etc. Most of the cake manufactured on a larger scale is shipped to Europe. The farmers being so very superstitious will not use cake, if it be even of a slightly different shape from what they are used to. By allowing the cottonseed to be exported in large quantities, the Indian capitalist is really letting a good deal of valuable material slip through his fingers. All this cottonseed can be, at no great cost, turned into crude oil, and this crude oil can be refined in India itself as we have just shewn. And if until now the Indian capitalists have been unwilling to start Refinery Works, and if they have failed in cases

where the start was made, the fault rather lies in the lack of experience and in inaccurate financial calculations regarding cost of machinery, freight, etc.

We might consider now in what practical fashion Government might come to the help of the oil pressing industry. Firstly, it is imperative that some check should be placed on the export of seed to foreign parts. It is useless to advocate the introduction of export duties on seed because such restriction on exports will be against the avowed free trade policy of the Indian Government; but in cases where such duties already exist in the form of countervailing duties, if any at all exist, the Indian capitalist can take advantage of their presence. There is at least one thing Indian Government can do without departing from its fiscal policy. It might levy on all imports of foreign vegetable oils, whether crude or refined, a revenue producing duty, which might then incidentally help the infant Indian oil industry.

In the matter of relieving the indigenous oil crushers, namely, the Telis, of their perpetual indebtedness, the Government can however render very material assistance by starting cooperative credit societies specially for this class of workers. In the districts where these Telis are found, we often come across a few of them quite well-to-do; if this well-to-do and better class of Telis, who frequently possess forty to fifty ghanis of their own, can be induced to serve as Directors on the Board of the Society, they will be able to know about real cases of financial hardship. The finances of this Society should be under a joint control of this Teli Directorate and Government officials. Loans should be given out at a cheap rate of interest, particularly at the time when the Telis have to buy seed but find themselves without any spare cash. What generally happens is this. As the seed market fluctuates a good deal, the Teli cannot buy seed at his convenience but must buy his stock when the market is cheapest for him, and when he has already made some arrangements for storage. It is rare indeed, that at the very time, he has the necessary cash; and therefore he has to resort to the Sowcar, who is sure to charge him a very high rate of interest, *i. e.*, nothing less than 12 per cent. If he is certain now that he can depend upon a suitable loan from the Cooperative Credit Society, he will find in the long run, that he is less indebted than when in the hands of the Sowcar.

Condition of the Country Telis.—This class is made up of individual Telis who have generally a family of three to four persons in the house. They have one or two bullocks as the case may be. When they buy the seeds for the consumption of their ghanis, they have to resort to funds from the Sowcars as stated above, who generally charge a heavy rate of interest. Besides, in off season the rate of seed fluctuates from 10 per cent. to 25 per cent., which makes it almost impossible for them to sell their finished products leaving a certain margin of profit for themselves. Famines coming in regular succession have almost killed their industry. Now what is generally noticed is, that the small Telis are often at a loss to store up their seed when they want to buy large stocks for future use. The cooperative societies can come to the help of small Telis in this direction by starting a central storage depôt where small purchasers can at nominal fees store their goods.

Proposals.—They must form Unions like Cooperative Credit Societies. I suggested to the Telis at several places with the idea of getting them together to cooperate but they seemed very slow to adopt the methods proposed. It is really a hardworking race and it would indeed be a pity to see them extinct.

Government should also encourage all efforts to utilise as completely as possible all the bye-products of the oil industry. This they can do by giving to the public practical information regarding the uses of these bye-products. Whatover remains as off oil or bad oil after the refining process is over can be utilised in the manufacture of soap. Refining Works themselves can start soap factories of their own.

Suggestions.—For this the Government Agricultural Stations must exert to show the farmers the falsity of their beliefs by actual experiments. The dairy methods must be taken in hand, whereby it could be proved that 80 per cent. of what is fed to the cattle comes back by way of manure, only 20 per cent. going towards the building up of the tissues and milk. Regular dairies on an experimental stage to start with, must be opened and then augmented into commercial paying concerns.

Barn yard manure is proved to be by far superior to any manure used and would be best suitable for our Indian soil. This process will help in the better breeding of farm cattle, which is so essential for an agricultural country like India where machine ploughs and such other machinery is not possible to be used commonly for several decades to come. Soil is so very uneven that farm cattle labour will always have to be resorted to, and until and unless the breed of farm cattle is improved there is hardly any bright future for the Agricultural Department of the country. There is also another way in which the Agricultural Department of the Government might assist the Telis and the oil pressing concerns; the cake, which the latter produce, can be recommended for use on the Agricultural Model Farms. The Agricultural Co-operative Societies might buy large quantities of this cake and sell it off to the farmers.

The Economic Condition of the Workers.—We must bear in mind in all our discussions here that the economic condition of the workers is most miserable; they toil from early morning till late at night and they get about 4 to 6 annas a day with which they have to support their family which consists very often of 4 or 5 members. Their living expenses have gone up immensely, so has the rent. Until and unless they form into unions, their condition will not materially improve. They would make very good additions to the oil factories as labourers since they have been working in the line from their childhood and they can utilise their brains to better advantage in their own hereditary occupation.

Causes of Failure of Cottonseed Factories.—The persons, who undertake the management of oil mills on a large scale, are generally unacquainted with the line. They are mostly Vakils who cannot devote their full time to it, though doubtless they are the most enterprising men. They generally commit mistakes at the time of buying the machinery, they go in only for the cheap machinery which is glaringly advertised; they are first fleeced in the purchase of the machinery, besides this no machinery agents give any guarantee, nor is such a guarantee demanded, for the successful working of the plant. The greatest mistake they commit is that when they order out the machinery from foreign countries they do not order out men for the time being who would train the natives. Of course the initial cost of such a process would be a little higher but it is always cheaper in the long run. Very often they have difficulties in financing their concerns. Further, a large capital is required in off seasons to stock the material. The seed market is very fluctuating, so if those having some experience of the seed market were to join the business they would do much better. In cottonseed oil mills for example, the chief items of profit are the oil and waste, *i.e.*, the soap stock. This soap stock, however, was mostly stored and not utilised in any way until very recently.

Recommendations.—Something like the Cottonseed Crushers' Association may be started in the chief centres like the City of Bombay, where important technical papers may be read and a Bureau of Publicity opened. When Seed Crushers' Associations are once formed, they can afford to have their own tank cars for storage of crude and refined oil for transhipment from *one place to another. This will save high freight charges, loss by leakage, loss by absorption, and high price of barrels.*

I should like to mention here that there is one particular form of cottonseed oil which can at present be produced with great profit in India and this is Sweet Oil. In the whole of England there is not a single factory for crushing out Sweet Oil from Indian Cottonseed. Most of the sweet oil there comes from the United States of America. If India were to export cottonseed in large quantities to England, it would not be possible for it to escape deterioration during transit, and cottonseed, if even slightly deteriorated, is useless for obtaining any sweet oil from it. America supplies the whole of Europe with edible cottonseed oil and there is no reason at all why India should not be a source of such supply. Until now Indian capitalists were rather sceptic about obtaining edible cottonseed oil because it used to be supposed in India that the percentage of acridity was higher in the Indian cottonseed so that any oil that was to be produced would get immediately rancid. But the experiments conducted on a commercial basis

by the Tata Oil Mills, the Indian Cotton Seed Oil Co. of Navsari and the Akola Mills have proved beyond doubt that it is possible to produce edible oil from the cottonseed and to replace ghee to a certain extent by this product.

Government should therefore look with favor on any attempt to produce edible oil from the Indian cottonseed, and this is a matter again in which the Agricultural Department should evince keen interest. The Indian capitalist will be immensely interested now in problems of seed selection and it is very probable that the attempts which are being made by the Agricultural Department will be crowned with success.

Anybody, who concerns himself with the development of the Oil Pressing Industry in Western India, will naturally come to the conclusion, however, that the major part of the difficulty lies in running a modern type of factory at a centre where the raw material is easily available. The attempts at starting such factories have miserably failed in some cases in the Bombay Presidency and Berars because of certain well known causes. It would be as well to recapitulate them here in order to impress upon enterprising persons interested in this industry the necessity of avoiding similar dangers. Of the many cases of failure that I examined, in very nearly 80 per cent. of them the radical mistake appeared to me to be in the choice of either insufficient or unsuitable machinery. Whenever a new concern was started, the guiding motive of the Directors appeared to be to invest as little as possible in the plant for the factory.

They very often fell a victim to the persuations of secondhand machinery dealers who furnished them with picturesque proofs of what a secondhand machine at a low cost would yield in quantity of output. When secondhand machinery is bought and set up for work, it is invariably the case that it gets out of gear. The services of a trained mechanic are always in demand and the Directors cannot always lay their hands upon the right sort of person. The result is that either the factory has to stop or that it must renew working after the importation and the putting up of absolutely new machinery; thus it happens that the promoters of the concern are placed in rather a bad way at the end of the whole business.

Even in cases where the Directors obtain quite new machinery, they are not very careful as to the right type of machinery to be used. They are ill advised either quite innocently by the expert whom they employ or by interested machinery agents. I would suggest that the promoters of an oil-pressing concern should make it a point of seeing various kinds of plants in actual working order before they buy any special set. Whenever possible they should obtain the services of an experienced machinist from the machinery agents themselves. Such a practice is quite common in Europe and America where the machinery agents as a matter of fact insist on sending their own man to put the machinery in good working order whenever they sell it. Otherwise they do not consider themselves responsible for any hitch in the smooth running of the plant.

It will be clear from the foregoing observations that with their inexperience in buying machinery, the Directors of the oil-pressing concerns must of necessity go wrong in their calculations; these often cause trouble from the beginning, as it is difficult to obtain more funds at short notice when the machinery is found to be worthless and has to be probably replaced by a new one.

Another point, which is largely overlooked, is the inefficiency of the selling department in Indian concerns. Goods are manufactured on a large scale, and in the case of such commodities as cake and oils there are difficulties in the way of warehousing them and keeping them in good condition and then if precautions are not taken for promptly disposing them off, the Company experiences a good deal of eventual loss. I would strongly recommend that new concers should not hesitate to spend a good deal upon the employment of experienced canvassing agents for their goods, and get some idea beforehand of the probable amount of the output necessary. With other concerns, however, there is a reverse tendency observable. They are content to see that their limited produce is sold off, and with this certain custom they are not anxious to get more and to increase their business. This policy would have been right in days when no competition existed, and when an established concern with an assured custom could demand a fairly high price; but such a thing is no longer possible, and oil

pressing concerns must now obtain a larger amount of custom and be for ever on the lookout for improving the quality of their goods and for diminishing the cost of their manufacture. It is only when they are keen on this that they can hope to profit by the large amount of raw material which Western India affords them.

The precautions which factory owners should take.—The refining plants ought to be started on the American lines and not on English lines. Most of the Refineries in England are for the refining of soap grade oils and not edible oils. Owing to the seed mostly imported by crude oil mills in England getting deteriorated in transit, only off oil can be produced from such seed, and not prime oil. Some modifications in the foreign machinery, which is well suited for Egyptian and Indian seeds, will have to be adapted to, and modified for, local conditions. The Indian seed has its own peculiarities which must be closely studied, and methods of crushing must be modified accordingly. It was generally believed on the strength of experiments conducted by Doctors Leather and Hooper, Chemists to the Government of India, that it was difficult to obtain anything like edible oil from Indian cottonseed as it contained a certain element which produced acridity in the resultant oil. The oil that is put on the Indian market during the last two years has proved beyond doubt that there is no such acridity in the oil and that the Indian cottonseed can yield almost as good oil as the American seed.

It is a well-known fact that the crude cotton oil is refined by treatment with caustic soda. This re-agent is at once a friend and an enemy of the oil and it requires the utmost care and skill in the manipulation of the refining operation, the slightest mistake proving fatal. It is in this respect that the oil millowners should engage the services of a chemist to determine the exact percentage of free fatty acids in every batch of oil to be refined.

Cake storing.—The cake house must be so arranged that light and air can pass through well; otherwise if the cakes are packed while moist, they are liable to be heated and, consequently, to become mouldy, deteriorating the value considerably. For drying, a sort of shelf-like arrangement must be made.

It appears to be very often the case that the railway freights are cheaper to exporting ports like Bombay or Karachi, irrespective of distance. For instance, seed coming from Ahmedabad to Bombay will pay less freight charges than seed coming from Ahmedabad to Navsari, a shorter distance. This goes to show that the Railways favor the export of seeds at the expense of any indigenous growth of the industry. Very often the difference in freight rate to Bombay is 50 per cent. less than for any of the intermediate stations. The Railway Companies may be requested to give some facilities during the infancy of the industry by way of special freight rates for bye-products such as oils and cakes.

The factories would do well to invest in a Cake Grinder. There will then be greater facility in export inasmuch as they will receive the 16 cwts. per ton freight rate whereas for Expeller, Ghani and Power Ghanis they are getting only 12 cwts. per ton freight rate. All the cake besides, which goes to Europe, is ground fine over there for cattle feeding purposes. This costs the European merchants from 3 to 5 shillings extra per ton for grinding and they would be only too glad to pay that amount to the manufacturer here. I have ascertained from some big European Exporters here that they are quite willing to pay for the grinding rather in India.

Seed storage.—This requires special precautions. The seeds must be kept dry and cool so as to prevent heating, especially if they be brought into the storage house in a damp state. They must also be not debarred from ventilation. I mention this because I have noticed latterly cases of severe loss due to this neglect in seed storage.

Y. G. PANDIT.

Part II.

APPENDIX A.

Exports—Cotton-seed.

Name of Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom	3,303,950	3,057,005	4,686,702	5,368,884	3,513,040	1,866,301	1,04,19,429	1,10,20,427	1,69,43,336	2,06,76,990	1,31,34,356	7,33,344
Aden and Dependencies ...	7,243	2,478	1,586	365	249	1,731	23,980	9,033	6,064	1,605	984	7,388
Ceylon	.....	262	16	25	244	12	.....	1,025	65	100	1,358	50
East Africa Protectorate ...	1,408	.....	.....	.....	.....	1	4,224	.....	.....	.....	.....	5
Other Countries	21	19	50	80	21	20 11,995	68	50	196	285	84	100 44,980
New Foundland and Coast Labrador.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25
Norway	381	.....	.....	.....	.....	13	11,445	.....	.....	.....	.....	35
Germany	39,408	43	29,300	24,701	29	.....	1,29,381	192	1,02,559	97,379	89	.....
Belgium	.....	2,000	4,955	12,999	2,080	32	.....	8,000	18,820	50,246	6,091	112
France	44,849	16,188	107,676	30,357	60,423	.....	1,50 782	58,504	3,63,693	1,14,682	2,41,552	.....
Austria-Hungary	1,999	.....	.....	.....	.....	.....	6,497	.....	.....	.....	.....	.....
Muscat—Oman	18	60	315	98	98	12	62	217	1,227	392	369	50
Egypt	235,728	68,550	.....	.....	.....	155	6,70,770	2,55,213	.....	.....	319	525
Other Countries	115	89	1	2	60	12	364	290	4	10	.....	56
Total ...	3,635,120	3,146,694	4,830,601	5,437,511	3,576,186	1,880,284	1,14,36,997	1,13,52,951	1,74,37,964	2,09,41,689	1,33,85,197	73,86,730

APPENDIX A—*continued.*

Export—Groundnut-seed, 1907 to 1913.

Name of Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
British Empire	3,300	.....	6,297	4,399	.....	.....	33,600	.....	48,071	26,394	.....	.....
Aden and Dependences ..	1,524	1,060	1,038	707	1,772	1,775	11,337	7,408	7,010	5,416	13,718	16,731
Bahrein Islands	1,302	1,841	3,727	2,863	4,436	3,581	10,095	16,403	30,861	24,551	40,888	32,381
Ceylon	.....	.....	.....	206	.....	12	.....	.....	.....	2,025	.....	100
Mauritius and Dependencies ...	37	.....	199	.....	229	25 12	310	.....	1,594	.....	2,031	300 125
East Africa Protectorate ...	2	990	.....	.....	.....	3	13	8,167	.....	.....	.....	30
Seychelles	.....	26	254	485	17	80	.....	202	1,976	4,089	174	709
Other Countries	22	6	154	.....	7	.....	149	.....	998	.....	75	.....
Germany	.....	.....	12,601	36,101	136,082	59,080	.....	.....	97,267	3,32,284	11,88,531	5,56,970
Holland	.....	.....	.....	.....	12,996	.....	.....	.....	.....	.....	1,14,464	.....
Belgium	.....	.....	79,388	166,120	244,994	136,627	.....	.....	608,268	15,28,771	21,29,774	13,23,598
France	81,306	82,245	342,421	666,494	404,957	682,430	6,26,059	6,61,407	26,25,039	57,93,165	36,67,688	63,94,856
Spain	3 998	16,994	3,803	37,743	37,025	9,296	35,732	1,37,484	29,471	3,52,401	3,25,151	88,488
Italy	.....	100	3,499	16,826	7,499	8,515	.....	700	26,992	1,35,231	64,866	92,403
Austria-Hungary	.....	.....	.....	14,331	27,283	45,154	.....	.....	.....	1,25,363	2,35,819	4,39,417
Turkey-Asia	303	1,177	3,542	3,778	.....	.....	2,779	10,615	30,219	32,169	.....	.....
Do. Levant	.....	.....	.....	.....	3,992	30 618	.....	.....	.....	.....	39,706	300 7,041
Do. Persian Gulf	.....	.....	.....	.....	1,749	1,149	.....	.....	.....	.....	16,588	11,477
Muskat-Oman	890	1,276	1,888	2,114	2,014	1,905	7,176	9,736	14,624	17,633	18,437	17,415
Native States in Arabia ...	1	.....	60	1,373	1,660	1,560	10	.....	600	11,089	15,386	14,569
Persia	550	479	1,021	889	892	970	4,486	3,820	7,371	7,119	8,454	9,366
Egypt	.....	11,733	18,794	28,478	41,280	21,750	.....	89,890	124,151	2,18,278	3,69,394	2,09,729
Portugal East Africa... ...	311	.....	.....	.....	1,507	1,165	3,421	.....	.....	.....	14,444	16,528
Other countries	7	9	19	.....	49	1	42	70	204	.....	506	10
Total ...	93,553	117,930	478,697	982,977	930,400	976,038	7,35,209	9,45,902	36,55,319	86,15,978	81,66,094	92,12,544

Export—Castor-seed.

Name of Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom	703,544	644,694	828,251	822,227	791,712	660,384	53,53,507	40,47,296	55,21,806	63,62,422	58,27,746	50,18,303
Mauritius and Dependencies ...	12	3	3,920	.....	100	6	96	30	25,728	.....	800	50
Victoria	800	.....	500	.....	.....	.....	6,050	.....	3,375	.....	.....	.....
Other countries	.....	.....	.....	30	32	.....	.....	.....	.....	270	252	.....
Russia	10,000	13,952	7,999	4,000	.....	.....	76,250	80,503	55,547	29,000	.....	.....
Russia, Southern	.....	.....	.....	.....	10,011	.....	.....	.....	.....	.....	71,335	.....
Germany	77,176	92,587	81,010	114,691	60,084	80,638	5,95,867	5,86,177	5,37,652	9,02,957	4,41,953	6,19,019
Belgium	147,625	162,073	242,662	271,608	288,305	186,749	11,13,306	9,98,991	15,88,253	20,93,610	21,16,106	14,40,506
France	171,459	252,457	196,161	237,642	236,259	238,146	12,37,998	15,70,998	13,00,149	18,60,453	17,74,849	18,16,183
Spain	4,000	2,000	4,000	21,000	29,200	9,319	29,000	12,500	28,100	1,55,625	1,39,977	64,232
Italy	206,875	161,876	225,185	217,991	238,273	97,110	15,70,203	10,17,291	15,14,206	18,85,288	16,95,004	7,41,389
Austr a-Hungary	12,153	5,841	1,679	.....	2,000	1,500	94,148	35,428	10,074	.....	14,000	10,500
U. S. A.	.....	.....	6,000	51,421	.....	.....	.....	.....	42,000	4,15,542	.....	.....
U. S. A., Atlantic Coast ...	.....	.....	.....	.....	294,028	359,156 1,000	.....	.....	.....	.....	22,08,674	22,13,908 7,500
Other countries	.....	1	10	.....	1	2	.....	7	62	.....	12	15
Total ...	1,333,644	1,335,484	1,597,377	1,763,610	1,935,005	1,634,010	1,00,76,425	83,51,221	1,06,26,952	1,37,05,167	1,42,90,708	1,23,33,165

APPENDIX A—*continued.*

Exports—Linseed.

Name of Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13
British Empire.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom	84,287	119	15,084	66,535	250,593	111,196	7,10,433	18,711	1,50,765	8,47,757	31,60,683	13,07,400
Aden and Dependencies ...	243	11	6	5	9	16	3,870	113	53	73	82	205
Ceylon	154	115	96	152	186	192	1,162	966	720	1,418	1,982	1,901
Victoria	439	300	.....	200	300	.....	3,290	2,325	.....	2,600	3,787	.....
New South Wales	300	898	600	2,730	640	24	2,512	6,959	6,000	35,490	8,080	216
Other Countries	37	60	76	94	93	80 24	323	508	829	975	1,153	709 238
Foreign Countries.												
Russia	.....	.....	2,402	3,000	.....	.....	.....	.....	25,177	86,000	.....	.....
Denmark	.....	.....	.....	.....	17,000	.....	.....	.....	.....	.....	20,400	.....
Germany	179,538	37,635	229,701	106,124	265,083	209,835	14,00,385	3,13,927	19,73,530	13,18,995	33,45,124	23,75,273
Holland	133,330	.....	57,476	268,021	259,218	196,429	11,68,699	.....	4,66,780	23,46,137	33,84,443	24,42,294
Belgium	267,066	64,402	344,527	1,094,718	2,125,233	1,442,462	21,51,871	5,34,653	30,51,817	1,32,58,727	2,71,61,984	1,70,01,704
France	917,085	452,545	439,645	707,198	1,155,459	990,588	73,46,045	37,86,616	38,57,318	81,80,471	1,47,68,340	8,08,37,608
Spain	22,078	33,109	48,396	37,500	25,002	61,510	1,95,369	2,62,532	4,25,666	4,44,312	3,14,585	6,78,860
Switzerland	.....	.....	2,000	.....	.....	.....	.....	.....	20,004	.....	.....	.....
Italy	566,010	413,731	508,035	413,572	527,260	472,684	44,47,897	33,03,926	43,92,863	48,16,249	65,27,780	53,81,628
Austria-Hungary	72,687	25,999	142,050	141,003	139,360	78,698	5,64,809	2,16,362	12,27,726	16,74,826	17,89,728	8,58,034
Greece	.....	.....	.....	6,000	8,000	8,002	.....	.....	.....	67,500	97,500	86,514
Japan	.....	.....	.....	81	.....	.....	.....	.....	.....	1,033	.....	.....
Egypt	2,209	1,305	75	856	1,463	1,758	18,429	14,451	750	8,742	14,890	15,930
Re-union	4,017	.....	.....	.....	.....	.....	33,391	.....	.....	.....	.....	.....
U. S. A.	690	.....	.....	27,000	.....	.....	5,182	.....	.....	3,56,750	.....	.....
U. S. A., Atlantic Coast ...	.....	.....	.....	.....	64,399	96,182	.....	.....	.....	.....	8,39,943	10,96,307
Other Countries	18	41	2	10	8	5 18	177	387	26	101	96	58 241
Total ...	2,250,188	1,030,350	1,790,171	2,819,799	4,839,306	3,669,056	1,80,59,844	84,45,596	1,56,00,024	3,34,50,248	6,15,73,680	4,20,84,892

Exports—Rape-seed.

Name of Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
British Empire—	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom	136,967	40,912	14,052	60,348	29,547	10,000	11,28,393	3,81,971	1,01,372	4,21,199	2,34,681	85,000
Ceylon	10	83	1	7	111	162	100	805	12	60	1,194	1,628
Straits Settlements	190	271	513	345	345	641	1,917	2,784	4,547	3,168	3,145	6,734
Natal	167	64	72	72	30	134	1,354	566	596	711	297	1,635
Mauritus and Dependencies ...	54	23	191	35	45	117	456	185	1,751	322	596	1,349
Other Countries...	159	66	104	58	47	40	1,421	598	829	527	449	194 340
Foreign Countries—												
Russia	.....	.....	.....	10,028	.....	1	.....	.....	.....	75,210	.....	.....
Denmark	.....	.....	.....	.....	4,000	.....	.....	.....	.....	.....	28,000	.....
Germany	659,593	77,952	306,074	654,927	88,805	139,788	59,99,185	7,24,097	22,04,335	49,36,398	6,54,561	17,02,604
Holland	65,092	2,008	40,036	99,775	83,080	24,993	5,43,861	14,366	3,12,280	6,66,352	5,82,234	2,04,694
Belgium	640,321	404,587	371,726	231,419	335,762	286,072	55,52,264	39,32,281	28,17,593	17,01,761	27,68,856	24,70,107
France	413,029	288,293	402,894	800,607	530,367	468,194	35,73,191	26,52,411	31,21,677	59,16,473	41,87,138	42,16,521
Spain	.....	1,004	16,480	24,869	8,177	5,009	.....	9,789	1,27,166	1,71,733	64,077	41,572
Italy	53,486	34,794	107,060	155,564	117,595	58,263	4,67,129	2,99,197	7,94,607	11,04,390	8,76,863	4,74,298
Austria-Hungary	25,081	10,027	101,416	94,226	30,005	7,930	2,09,693	90,122	7,22,737	6,76,958	2,71,463	65,746
Japan	.....	.....	.....	58,136	2	4	.....	.....	.....	3,42,019	15	28
U. S. A.	16	.....	.....	500	.....	.....	100	.....	.....	4,125	.....	.....
U. S. A.—Atlantic Coast ...	.....	.....	.....	.....	1,000	1,000	.....	.....	.....	.....	8,375	9,000
Other Countries...	.....	21	3	4	1	5	.....	176	24	42	12	51
Total ...	1,994,165	860,105	1,360,622	2,190,930	1,228,919	1,052,370	1,72,79,064	81,09,288	1,02,09,526	1,60,71,448	96,81,936	92,81,501

APPENDIX A—*continued.*

Exports—Mustard-seed.

Name of Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
British Empire—	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom	.....	201	201	.....	832	26 101	.....	2,010	2,010	.....	9,984	301 1,319
Ceylon	240	18	139	431	832	1,001	1,986	180	1,179	4,497	9,660	8,924
Straits Settlements (including Labuan)	271	301	149	103	224	251	2,739	3,514	1,529	1,222	2,600	2,957
Natal	25	11	12	40	72	60	238	227	249	562	1,007	839
Mauritius and Dependencies ...	32	10	82	46	103	67	235	105	847	588	1,938	1,075
Other Countries...	94	66	60	73	84	16	957	693	634	734	912	206
Foreign Countries—												
Russia	.....	.....	.....	100	.....	1 35	.....	.....	.....	1,400	.....	10 455
Germany	4,598	1,762	7,701	6,224	8,306	15,498	60,691	28,296	1,04,959	80,396	1,08,255	1,75,687
Holland	.....	.....	.....	3,258	1,993	200	.....	.....	.....	26,064	16,350	2,800
Belgium	7,178	3,954	7,852	1,005	9,579	10,835	1,05,962	62,096	1,09,451	1,43,894	1,38,349	1,44,064
France	25,603	31,006	27,925	37,908	43,303	33,853	3,74,949	4,53,454	3,05,154	5,84,004	6,54,518	4,49,554
Italy	.....	.....	400	.....	30	100	.....	.....	4,000	.....	480	1,211
Austria-Hungary	.....	.....	.....	15	100	51	.....	.....	.....	135	2,000	459
U. S. A.	.....	.....	2,300	60	.....	.....	.....	.....	29,900	7,800	.....	.....
U. S. A.—Atlantic Coast ...	.....	.....	.....	.....	1,100	22 1,000	.....	.....	.....	.....	15,309	265 14,000
Other Countries...	23	62	50	64	47	16 9	276	620	529	771	611	192 105
Total ...	33,064	37,415	46,871	58,873	70,645	63,141	5,56,973	5,51,195	6,50,441	8,52,037	9,62,370	8,04,423

Exports—Poppy-seed.

Name of Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
British Empire—	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom	.....	100	1	1	1	1	7	1,306	13	21	17	11
Aden and Dependencies ...	117	30	19	17	33	14	1,094	318	232	222	470	250
Ceylon	123	118	93	121	107	170	1,397	1,206	981	1,285	1,262	1,948
Straits Settlements	222	174	233	182	201	351	2,502	1,782	2,213	2,009	2,088	3,888
Hongkong	151	2	1	2	1	.....	1,746	15	20	15	15	.....
Other Countries...	68	47	74	22	46	75	728	482	746	282	563	913
Foreign Countries—												
Denmark	.....	491	201	.....	1,020	.....	.....	3,860	1,859	.....	10,000	.....
Germany	155,646	93,286	97,311	54,330	75,165	33,914	16,93,081	9,81,106	9,42,969	5,59,440	8,02,322	4,13,271
Holland	.....	.....	.....	.....	4,000	4,000	.....	.....	.....	.....	44,000	46,000
Belgium	305,053	165,914	139,997	94,653	157,895	38,703	39,50,392	17,64,059	13,25,185	9,58,873	16,66,044	4,61,239
France	428,657	341,191	379,965	449,006	318,635	292,342	43,64,783	35,95,312	35,68,561	46,75,197	34,27,577	33,74,114
Italy	201	.....	.....	10,002	6,463	.....	1,531	.....	.....	1,03,277	71,869	.....
Austria Hungary	.....	.....	4,000	.....	2,700	602	.....	.....	35,000	.....	29,700	8,455
Japan	542	526	.....	506	211	222	6,808	5,443	.....	5,595	2,599	2,664
Other Countries...	2	26	7	21	21	25	30	159	87	240	255	303
Total ...	890,782	601,805	621,002	608,935	566,979	370,480	90,34,052	63,55,098	58,77,866	63,06,456	60,58,781	43,13,063

APPENDIX A—*continued*

Exports—Niger-seed.

Name of Country	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
British Empire—												
United Kingdom	3,908	7,262	4,311	64,979	44,020	14,611	33,182	60,427	34,452	4,99,368	3,49,114	1,16,187
Victoria	342	322	350	261	360	.....	2,626	2,096	2,231	1,892	2,640	.....
Other Countries...	21	.....	.....	40	87	4	175	.....	.....	289	630	38
Foreign Countries—												
Germany	983	4,998	7,201	1,104	7,324	2,105	8,632	31,310	44,787	8,842	53,282	16,652
Belgium	100	300	.....	.....	.....	130	1,005	3,015	.....	.....	.....	780
France	15,308	18,198	109,485	41,975	45,616	43,201	1,31,973	1,12,566	7,17,470	3,16,611	3,45,025	3,30,700
Italy	.....	.....	.....	.....	10,448	16,070	.....	.....	.....	.....	80,542	1,20 183
Austria Hungary	.....	.....	1,500	2,000	.....	.....	.....	.....	11,250	16,006	.....	.....
U. S. A.	39	.....	.....	.....	.....	.....	273	.....	.....	.....	.....	.....
Total ...	20,701	31,080	122,847	110,359	107,855	76,520	1,77,836	2,09,214	8,10,190	8,43,002	8,31,233	5,87,732

Exports—Mowra-seed.

Name of Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
British Empire—												
United Kingdom	163,997	101,544	6,021	29,412	6,050	1	9,35,191	6,33,027	38,002	2,18,627	45,670	10
Foreign Countries—												
Germany	6,001	10,921	323,980	188,191	529,003	176,118	33,005	74,270	19,13,844	14,26,002	39,22,327	14,17,846
Holland	.....	.....	.....	.....	3,000	14,632	.....	.....	.....	.....	24,000	1,20,714
Belgium	209,885	142,805	162,787	47,496	119,305	59,611	12,19,700	8,56,143	10,17,753	4,17,697	9,12,477	4,81,478
France	357,607	141,467	178,448	31,966	51,100	3,062	19,53,182	8,70,058	10,74,362	2,44,378	3,84,908	22,434
Italy	1,000	1,000	9,085	5,010	16,000	1	6,000	6,000	55,289	39,584	1,19,500	10
Other Countries...	.....	.....	15	.....	.....	.....	.....	.....	150	.....	.....	.....
Total ...	738,490	397,737	680,336	302,075	724,458	253,425	41,47,078	24,39,498	40,99,400	23,46,288	54,08,882	2,04,24,922

APPENDIX A—*continued.*

Exports for the six years 1907 to 1913.

CASTOR OIL.

Name of the Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
British Empire—	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom ...	4,180	4,887	.....	720	9	864	9,408	6,356	.....	1,200	15	1,000
Aden and Dependencies ...	780	2,602	765	665	1,102	410	1,493	3,752	1,305	1,262	1,972	944
Mauritius and Dependencies...	3,148	1,060	.....	4,920	.....	.....	4,759	1,562	.....	9,430	.....	.....
Zanzibar and Pemba ...	1,187	1,019	322	1,252	1,337	1,009	1,999	1,512	398	1,421	1,982	1 749
East African Protectorate ...	2,336	595	56	923	1,164	3,301	4,163	992	105	1,464	1,981	6,357
Other Countries ...	184	161	63	192	84	60	308	303	106	330	215	106
Foreign Countries—												
Turkey Asiatic	114	1,780	2,393	1,765	.....	.....	172	3,376	4,066	3,701	.....	.....
" " Persian Gulf ...	.....	.....	.....	.....	894	628	.....	.....	.....	.....	2,022	1,380
Siam	48	471	81	96	.....	30	80	1,307	165	200	.....	55
Portuguese East Africa ...	579	224	180	1,212	225	9	904	275	240	1,659	208	20
Other Countries ...	314	136	238	157	141	286	546	245	380	386	240	514
Total ...	12,870	12,939	4,088	11,902	4,956	6,597	23,832	19,680	6,765	21,553	8,735	12,125

COCOANUT.

British Empire—												
Aden and Dependencies ...	5,242	4,759	2,449	4,990	8,801	500 6,538 144	11,045	8,848	4,565	10,318	18,098	1,200 14,821 300
Zanzibar and Pemba ...	.....	665	.....	120	432	204	.....	1,332	.....	200	890	440
East African Protectorate ...	413	520	485	160	.....	114 1,024	740	1,084	1,177	440	.....	2,940
Other Countries—												
Turkey Asiatic	2,298	2,761	3,239	1,001	.....	.....	5,402	5,674	6,001	2,220	.....	.....
" " Persian Gulf ...	.....	.....	.....	.....	997	457	.....	.....	.....	.....	2,706	1,162
Muskat or Oman ...	2,394	546	15,111	1,649	1,036	928	5,312	1,007	2,829	3,544	2,040	1,921
Other Native States in Arabia.	596	.....	6	2,386	4,274	2,796	1,527	.....	10	5,141	10,115	6,227
Persia	1,568	307	1,323	990	211	656	3,602	621	2,606	2,265	522	1,529
Siam	.....	78	159	897	.....	9	.....	156	371	2,092	.....	20
Portuguese East Africa ...	1,107	1,141	953	1,656	1,551	1,320	2,409	2,097	1,837	3,131	3,152	3,150
Madagasker	890	339	279	795	890	533	1,786	565	625	2,025	1,489	1,251
Other Countries... ...	334	142	138	480	231	222	648	254	283	1,177	440	473
Total ...	14,954	11,434	10,726	15,140	18,537	15,435	32,691	21,997	20,717	32,588	39,695	35,819

APPENDIX A—*continued.*

Exports for the six years 1907 to 1913.

TIL OR GINGILY.

Name of Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
British Empire—	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Aden and Dependencies ...	10,485	2,814	8,202	6,807	2,550	27 24,224	20,761	4,896	14,343	12,949	5,009	55 49,201
Bahrein Islands ...	374	400	1,789	826	1,602	2,412	716	773	3,338	1,607	3,482	4,807
Ceylon	.....	66	278	90	618	974 105	.....	132	518	153	1,500	2,245 232
Natal	1,427	447	1,429	403	21	561	3,106	958	2,389	783	42	1,307
Mauritius and Dependencies .	48,634	48,373	93,616	49 501	19,568	60 4,542	91,372	81,527	1,43,391	86,081	36,915	150 16,389
Zanzibar and Pemba ...	2,236	384	291	360	.....	1,982	5,125	525	443	710	.....	3,276
East African Protectorate ...	1,739	178	1,219	510	649	.....	3,283	369	1,897	883	1,105	.....
Sychelles	326	135	364	645	443	418	660	262	692	1,309	919	880
Other Countries... ...	375	102	184	287	451	.....	774	195	369	534	884	.....
Foreign Countries—												
Turkey Asiatic	614	1,023	4,203	778	.....	.....	1,425	2,064	7,760	1,282	.....	.....
Persian Gulf	.....	.....	.....	.....	4,563	384	.....	.....	.....	.....	6,505	604
Muskat or Oman ...	33,759	50,545	54,639	57,292	65,710	48,692	66,413	93,816	90,158	1,03,989	1,15,935	98,903
Other Native States in Arabia.	.....	.....	102	1,324	1,077	2,349	.....	.....	208	2,657	2,336	5,254
Persia	812	5,706	2,869	3,076	2,040	609	1,642	10,246	5,046	6,170	3,982	1,282
Egypt	2,557	754	1,620	10,978	2,217	6,617	3,597	1,493	2,599	21,426	4,368	13,838
Portuguese East Africa ...	6,438	4,499	5,250	3,562	1,572	1,083	13,266	8,697	8,722	6,957	3,338	2,338
Madagascar	5,630	3,342	4,875	1,842	3,096	1,824	11,716	6,071	7,624	5,537	6,522	2,955
German East Africa ...	1,620	336	391	1,368	2,394	111 5,151	3,134	672	618	2,629	4,829	275 11,074
Italian East Africa ...	.....	1,600	3,613	7,416	3,063	1,320	.....	3,029	6,703	15,010	6,217	2,574
Other Countries	875	444	877	462	174	.....	1,545	808	1,385	888	336	.....
Total ...	117,901	121,148	185,811	147,527	111,808	106,445	2,28,535	2,16,533	2,98,203	2,71,558	2,04,224	21,76,597

Exports for the six years from 1907 to 1913.

MUSTARD OR RAPE.

Name of the Country	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
British Empire—												
United Kingdom ...	9	373	.....	366	9	239	24	1,050	.....	1,080	38	614
Straight Settlement ...	93	132	316	35	136	.....	381	475	1,240	146	544	.....
East African Protectorate ...	412	300	547	45	899	285	662	612	1,064	75	1,507	684
Other Countries... ...	114	95	552	364	259	6	284	210	1,295	745	600	12
Foreign Countries	141	34	84	65	48	36	337	67	164	152	113	85
Total ...	769	934	1,499	875	1,351	566	1,688	2,414	3,763	2,198	2,802	1,395

EARTHNUT.

Name of the Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
British Empire	.....	.....	.....	.....	.....	193	.....	.....	.....	.....	.....	346
Mauritius and Dependencies...	2,160	4,498	.....	667	375	877	4,320	7,298	.....	1,017	625	1,543
Other Countries	.....	.....	.....	36	180	9	.....	.....	.....	60	375	12
Foreign Countries	.....	.....	186	.....	.....	.....	.....	.....	310	.....	.....	.....
Total ...	2,160	4,498	186	703	555	1,079	4,320	7,298	310	1,077	1,000	1,901

APPENDIX A—*continued.*

Exports for the six years from 1907 to 1913.

LINSEED.

Name of the Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
British Empire	.....	.....	.....	.....	.....	837	.....	.....	.....	.....	.....	1,660
Foreign Countries	195	420	436	116	186	.....	421	723	859	200	343	.....
Turkey Asiatic	236	25	563	445	.....	.....	467	61	958	1,119	.....	.....
Persian Gulf	.....	.....	.....	.....	786	757	.....	.....	.....	.....	1,863	1,563
Other Countries	12	15	192	50	15	106	24	21	396	148	40	232
Total ...	443	460	1,191	611	987	1,700	912	805	2,213	1,467	2,246	3,455

OIL CAKE.

Name of the Country.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
British Empire—	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom ...	253,354	180,438	125,784	181,149	136,710	219,105	10,02,185	7,22,980	4,91,990	6,08,622	5,24,956	9,16,583
Ceylon	1,774	393	2,415	3,963	28,113	3,035	4,013	1,809	8,665	16,887	1,09,785	13,203
Mauritius and Dependencies...	400	.....	.....	.....	.....	.....	18	.....	120	108	.....	.....
Other Countries	6	.....	17	27	.....	.....	.....	.....	.....	.....	.....	.....
Germany	6,330	4,327	28,629	23,754	28,901	18,431	12,660	17,306	68,665	52,203	89,467	64,495
Holland	.....	.....	.....	.....	2,001	9,823	.....	.....	.....	.....	9,636	53,115
Belgium	.....	1,876	33	.....	.....	.....	.....	8,956	183	.....	.....	.....
Japan	426	20	.....	2,700	2,198	.....	1,244	82	.....	6,445	7,145	.....
Other Countries	.....	.....	100	20	.....	.....	.....	.....	771	85	.....	.....
Total ...	262,290	187,054	156,978	211,613	197,923	250,394	10,21,920	7,51,083	5,70,394	6,84,350	7,40,989	10,47,396

APPENDIX B.

General Imports in Oils for the last six years.

COCOANUT OIL.

Name of Country.	Quantities.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912 13.*	1907-08.	1908-09.	1909 10.	1910-11.	1911-12.	1912 13.
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom ...	1,825	1,275	1,625	2,447	2,389	2,767	5,838	3,298	4,868	9,071	8,150	9,993
Ceylon ...	87,851	1,283	2,466	7,015	1	.....	1,75,863	1,663	4,950	13,879	3	.....
Seychellis ...	14,707	805	12,086	.....	.....	.....	34,528	1,365	24,475	.....	.....	.....
Other Countries ...	50	.....	.....	70	.....	.....	127	.....	.....	195	.....	.....
Total ...	104,433	3,363	16,177	9,532	2,390	2,767	2,16,356	6,256	34,293	23,253	8,153	9,993

LINSEED OIL.

Name of Country.	Qantities.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom ...	236,119	245,927	184,344	223,218	270,394	245,414	4,17,447	4,23,560	3,42,206	5,31,314	6 57,677	5,65,558
Foreign Countries ...	.....	.....	.....	.....	.....	377	.....	.....	.....	.....	.....	589
Germany ...	.....	.....	302	69	1	25 51	.....	.....	398	249	5	231 128
Total ...	236,119	245,927	184,646	223,287	270,395	245,867	4,17,447	4,23 560	3,42,604	5,31,563	6 57,682	5,66,606

APPENDIX B—*continued.*

MUSTARD OIL OR RAPE OIL.

Name of Country.	Quantities.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
British Empire ...	250	.....	.....	.....	10	527	669	.....	.....	.....	15	1,120
Foreign Countries ...	.....	.....	.....	.....	.....	40	.....	.....	.....	.....	.....	85
Java ...	.....	.....	9	.....	.....	.....	.....	.....	20	.....	.....	.....
United States of America ...	514	.....	.....	.....	.....	.....	1,057	.....	.....	.....	.....	.....
Total ...	764	.....	9	.....	10	567	1,726	.....	20	.....	15	1,205

OTHER SORTS.

Name of Country.	Quantities.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom ...	58,101	7,769	8,450	7,923	3,909	2,889	1,12,379	20,092	23,215	23,070	10,262	9,577
Other Countries ...	15	1	1	13	.....	40 2	20	6	3	34	.....	141 15
Foreign Countries ...	.....	.....	.....	.....	.....	1,336	.....	.....	.....	.....	.....	3,118
Germany ...	29	43	154	232	357	1,316	132	225	947	1,024	1,005	4,014
France ...	202	203	281	41	116	1	1,128	1,131	1,695	206	616	5
Italy ...	749	806	922	121	.....	25	2,849	4,175	4,905	263	.....	50
Other Countries ...	25	273	752	64	.....	248	115	532	2,653	323	.....	420
Total ...	60,121	9,095	10,560	8,394	4,382	6,407	1,16,623	26,161	33,418	24,920	11,884	17,340
Total Vegetable Oils ...	401,437	258,385	211,392	241,213	277,177	255,608	7,52,152	4,55,977	4,10,335	5,79,736	376	5,85,144

APPENDIX C.

Area under cultivation for different Oil-seeds—Cotton.

District.	Area.					Outturn in Tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
	Acres.	Acres.	Acres.	Acres.	Acres.	In	bales of 400	lbs. each.	(lint.)	
Presidency Proper—										
Ahmedabad	309,832	243,050	253,814	338,820	67,428	52,328	47,359	83,343	77,589	6,152
Kaira	12,792	10,601	11,275	20,356	33,377	3,293	2,305	2,788	2,759	2,886
Panch Mahals	9,037	7,885	10,292	16,166	27,882	2,055	1,163	2,252	2,304	2,556
Broach	288,422	262,428	269,045	281,091	317,328	72,327	75,448	104,760	90,792	60,246
Surat	153,468	126,621	139,452	164,442	177,373	41,417	29,756	46,978	42,178	34,818
West Khandesh	393,005	395,913	404,951	464,459	487,085	18,054	50,479	74,640	99,666	42,619
East Khandesh	870,304	826,151	839,368	915,567	952,640	55,814	148,367	213,340	223,620	164,169
Nasik	85,182	40,666	62,433	99,599	147,209	2,888	2,745	10,925	22,824	22,984
Ahmednagar	145,186	36,409	170,881	214,127	88,654	5,642	2,548	31,353	22,751	4,575
Poona	11,424	532	15,855	25,363	13,086	176	31	2,312	2,549	360
Sholapur	58,992	16,835	96,957	78,815	95,945	1,079	1,272	20,199	9,670	4,125
Satara	25,809	20,830	15,834	15,734	14,577	3,095	3,384	2,111	2,426	2,034
Belgaum	228,758	217,110	232,770	277,686	213,354	22,911	22,279	36,371	51,022	18,755
Bijapur	543,806	370,591	608,670	641,095	698,170	47,957	26,207	83,016	94,375	66,545
Dharwar	609,396	600,806	608,112	685,729	615,485	87,303	49,563	98,886	103,629	44,161
Thana	3	4	3	4	9	...	...	...	...	...
Kolaba	...	...	...	...	...	...	...	...	...	...
Ratnagiri	...	...	1	2	2	...	...	...	...	...
Kanara	...	...	4	...	1	...	...	...	...	...
Sind—										
Karachi	343	254	275	517	1,687	154	52	103	258	662
Hyderabad	132,683	124,060	115,099	153,226	193,937	54,063	32,565	45,321	40,222	122,203*
Sukkur	4,296	2,376	1,845	2,831	2,774	1,073	1,175	475	384	243
Larkana	580	383	200	174	798	167	93	50	29	52
U. S. Frontier	1,895	560	819	965	660	379	112	169	200	117
Thar and Parkar	116,874	129,004	92,430	115,960	135,800	78,330	65,693	56,612	55,081	...

* Combined outturn.

APPENDIX C—*continued.*

Area under cultivation for different Oil-seeds—Groundnut.

District.	Area.					Outturn in Tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
	Acres.	Acres.	Acres.	Acres.	Acres.					
Presidency Proper—										
Ahmedabad	1	...	1	1	5	...	...	...	...	...
Kaira	3	...	...	1	...	...	...	...	...	...
Panch Mahals	1	3	4	29	154	...	...	...	...	...
Broach	...	...	12	85	128	...	...	...	...	...
Surat	115	117	192	208	315	...	...	...	...	...
West Khandesh	1,615	1,585	1,789	1,615	1,017	785	1,522	2,096	1,856	759
East Khandesh	3,722	4,843	4,270	2,798	2,002	1,976	5,513	4,328	3,119	1,452
Nasik	9,758	9,369	10,146	10,680	12,337	4,352	6,797	8,946	11,443	10,585
Ahmednagar	3,836	1,478	2,923	4,254	5,139	1,307	1,073	2,675	3,846	4,090
Poona	12,753	12,355	12,205	12,680	12,721	6,864	12,311	11,715	12,877	9,763
Sholapur	19,865	15,004	24,537	37,905	55,326	5,097	12,560	24,373	38,010	40,467
Satara	55,992	61,683	67,086	74,470	95,461	50,244	61,270	77,117	92,256	95,507
Belgaum	2,251	2,502	5,078	9,163	16,141	987	2,066	5,724	7,651	15,294
Bijapur	153	66	110	69	88	...	...	...	...	...
Dharwar	34	60	99	53	75	...	...	...	...	...
Thana	...	...	...	1	19	...	...	...	...	...
Kolaba	...	...	...	2	8	...	...	...	...	...
Ratnagiri	1	...	...	1	17	...	...	...	...	...
Kanara	...	...	5	12	63	...	...	...	...	...
Sind—										
Karachi	...	...	...	...	3	...	...	...	...	...
Hyderabad	...	4	...	...	2	...	...	...	...	...
Sukkur	...	...	...	...	...	...	...	...	...	...
Larkana	...	...	...	...	...	...	...	...	...	...
U. S. Frontier	...	...	...	...	...	...	...	...	...	...
Thar and Parkar	2	...	...	...	1	...	...	...	...	...

APPENDIX C—*continued.*

Area under cultivation for different Oil-seeds—Niger seed.

District.	Area.					Outturn in Tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
Presidency Proper.										
Ahmedabad	...	...	...	...	...	*Not available.*				
Kaira	...	...	...	...	...					
Panch Mahals	...	...	...	...	253					
Broach	...	...	...	...	...					
Surat	...	448	224	261	201					
West Khandesh	...	7,382	8,086	6,729	6,711					
East Khandesh	...	9	12	36	14					
Nasik	76,368	91,492	93,987	89,388	93,233					
Ahmednagar	16,755	19,850	19,898	19,337	19,225					
Poona	27,835	29,131	31,856	31,321	33,446					
Sholapur	7,142	9,741	8,487	6,636	8,224					
Satara	13,980	18 508	19,443	21,384	18,682					
Belgaum	7,763	8,997	8,885	8,332	7,391					
Bijapur	12,455	6,290	6,013	6,562	6,474					
Dharwar	3,421	2,836	4,072	5,297	4,028					
Thana	6,592	6,726	6,565	6,762	7,705					
Kolaba	784	1,150	974	1,482	1,428					
Ratnagiri	7,245	7,281	7,836	7,392	7,102					
Kanara	54	18	84	75	43					
Sind.										
Karachi	6,004	22,373	11,850	14,296	10,905					
Hyderabad	48,263	117,513	58,797	54,605	53,123					
Sukkur	12,288	19,218	10,004	12,509	3,319					
Larkhana	51,224	75,681	50,783	70,684	46,262					
Upper Sind Frontier ...	24,010	29,526	16,209	12,258	10,257					
Thar and Parkar	6,425	34,857	10,777	15,957	10,732					

APPENDIX C—*continued.*

Area under cultivation for different Oil-seeds—Sesamum.

District.	Area.					Outturn in Tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
Presidency Proper.										
Ahmedabad	27,307	18,731	23,455	19,007	8,148	997	1,564	3,246	2,741	156
Kaira	16,654	12,128	10,075	10,342	8,286	2,452	938	1,291	1,399	157
Panch Mahâls	31,368	36,895	26,416	37,338	8,330	1,772	3,178	3,338	5,716	148
Broach	13,208	11,463	10,313	9,918	8,031	1,312	1,515	1,804	1,386	576
Surat	3,808	4,069	3,224	3,112	3,673	531	467	457	509	444
West Khandesh	76,098	70,171	85,498	53,209	42,494	2,543	10,716	10,039	6,817	4,062
East Khandesh	39,199	38,067	30,491	22,140	17,717	1,992	5,386	4,764	3,390	1,647
Nasik	85,854	75,421	61,653	64,756	78,440	2,171	4,817	5,945	9,539	6,652
Ahmednagar	45,932	24,768	50,040	52,021	46,541	1,261	188	5,586	5,643	1,869
Poona	4,471	3,905	4,707	7,390	3,533	106	354	343	781	102
Sholapur	7,416	4,716	17,559	11,651	13,047	54	295	1,803	848	541
Satara	419	294	399	394	299	3	36	51	41	18
Belgaum	7,909	7,495	8,942	7,103	9,635	296	626	1,289	1,015	954
Bijapur	36,543	8,605	28,688	12,523	27,845	1,301	134	2,522	1,863	2,312
Dharwar	17,258	13,718	26,036	6,370	10,467	1,891	857	3,289	739	774
Thana	1,798	1,796	1,822	1,798	1,776	200	314	325	289	263
Kolaba	2,821	2,759	2,817	2,393	2,307	390	369	418	345	324
Ratnagiri	436	332	268	388	207	1,333	1,804	906	2,524	1,840
Kanara	111	101	147	105	120	...	...	...	...	...
Sind.										
Karachi	4,153	10,593	6,997	9,182	783	184	1,825	751	1,312	194
Hyderabad	7,513	11,877	12,223	18,205	13,499	451	1,362	1,091	3,137	985*
Sukkur	4,243	6,223	3,246	3,967	3,633	378	803	285	459	522
Larkhana	4,685	6,558	4,032	9,724	2,994	208	1,001	324	1,388	212
Upper Sind Frontier ...	29,780	36,747	29,694	34,500	30,529	2,374	6,406	2,691	4,797	2,154
Thar and Parkar	2,617	5,573	6,986	7,628	1,675	140	299	498	780	*

* Combined outturn.

APPENDIX C—*continued.*

Area under cultivation for different Oil-seeds—Castor-seed.

District.	Area.					Outturn in Tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
Presidency Proper.										
Ahmedabad	25,985	16,248	13,778	13,450	6,811	*Not available.*				
Kaira	22,812	10,403	10,300	12,938	8,443					
Panch Mahals	3,193	3,635	4,071	4,372	1,755					
Broach	2,026	2,443	1,647	1,914	972					
Surat	17,689	19,798	21,227	20,651	11,229					
West Khandesh	15,448	15,359	13,393	17,910	15,767					
East Khandesh	1,357	1,243	1,302	1,514	756					
Nasik	1,177	798	1,039	1,489	1,376					
Ahmednagar	247	295	534	278	281					
Poona	126	168	199	191	94					
Sholapur	2,942	2,483	2,533	2,273	1,773					
Satara	272	332	300	280	475					
Belgaum	3,716	3,194	3,254	2,958	3,709					
Bijapur	2,779	1,375	1,446	1,353	1,655					
Dharwar	8,856	6,928	7,740	5,992	7,675					
Thana	779	743	767	920	1,058					
Kolaba	16	20	22	26	28					
Ratnagiri	...	...	...	1	1					
Kanara	87	49	76	73	63					
Sind.										
Karachi	265	58	52	231	70					
Hyderabad	...	8	...	...	...					
Sukkur	...	...	...	...	...					
Larkhana	...	...	...	...	...					
Upper Sind Frontier ...	...	...	...	...	...					
Thar and Parkar	385	92	100	83	12					

APPENDIX C—*continued.*

Area under cultivation for different Oil-seeds—Safflower.

District.	Area.					Outturn in Tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
Presidency Proper.										
Ahmedabad	7,306	9,476	5,245	5,711	2,291	*Not available.*				
Kaira	1,327	1,152	367	627	119					
Panch Mahals	...	...	...	...	...					
Broach	...	...	...	...	...					
Surat	...	...	...	...	...					
West Khandesh	8	21	10		38					
East Khandesh	1,473	1,305	1,357	1,688	1,428					
Nasik	8,650	7,659	8,526	13,384	14,957					
Ahmednagar	93,984	137,222	101,631	116,925	87,429					
Poona ...	62,500	76,290	65,004	66,547	42,967					
Sholapur	98,916	132,204	89,679	122,464	66,796					
Satara	26,473	32,163	23,812	28,742	21,482					
Belgaum	25,383	9,522	27,684	25,295	24,640					
Bijapur	63,960	93,677	66,843	68,565	46,823					
Dharwar	31,879	31,633	29,753	27,917	20,690					
Thana	6	1	1	...	5					
Kolaba	2	4	3	...	7					
Ratnagiri	...	...	...	...	...					
Kanara	...	1	2	...	...					
Sind.										
Karachi	...	...	...	...	...					
Hyderabad	...	...	...	...	...					
Sukkur	...	...	...	...	...					
Larkhana	...	...	...	...	...					
Upper Sind Frontier ...	...	...	...	...	...					
Thar and Parkar	...	...	...	...	...					

APPENDIX C—*continued.*

Area under cultivation for different Oil-seeds—Rape-seed.

District.	Area.					Out-turn in tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
Presidency Proper—										
Ahmedabad	1,519	2,238	1,527	1,473	172	571	517	436	339	17
Kaira	63	76	187	275	21	16	19	56	57	4
Panch Mahals	68	905	1,156	1,882	21	121	122	227	336	3
Broach	...	...	...	...	...	...	...	...	...	...
Surat	1	2	21	25	...	...	...	...	...	...
West Khandesh	8	17	37	445	159	...	...	...	...	...
East Khandesh	4	4	10	10	5	...	...	...	...	...
Nasik	...	...	...	...	23	...	...	...	...	...
Ahmednagar	...	...	...	...	1	...	...	...	...	...
Poona	...	...	24	...	...	...	...	...	...	...
Sholapur	...	...	...	...	...	...	...	...	...	...
Satara	...	...	...	...	...	...	...	...	..	...
Belgaum	...	...	...	...	...	...	...	...	...	...
Bijapur	...	...	43	...	...	...	...	...	...	...
Dharwar	344	...	...	...	2	...	...	...	...	...
Thana	10	11	11	12	8	...	...	...	...	...
Kolaba	...	...	...	...	...	...	...	...	...	...
Ratnagiri	1	1	...	...	1	...	...	...	...	...
Kanara	...	...	...	...	...	...	...	...	...	...
Sind—										
Karachi	1,165	5,897	3,320	2,714	631	104	884	296	218	51
Hyderabad	4,577	10,351	9,626	14,108	5,933	420	1,700	1,581	3,527	...*
Sukkur	5,952	10,210	8,384	4,886	1,493	664	1,094	1,497	1,051	235
Larkhana	26,690	47,191	28,557	35,300	35,827	2,668	9,619	2,103	2,834	2,876
Upper Sind Frontie ...	22,635	40,265	16,650	14,237	6,542	2,267	9,593	4,224	2,679	273
Thar and Parkar	745	3,784	604	1,355	507	40	202	35	75	797*

* Combined figure for Hyderabad and Thar and Parkar.

APPENDIX C—*continued.*

Area under cultivation for different Oil-seds—Cocoanut.

Dtstrict.	Area.					Out-turn in tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
Presidency Proper—										
Ahmedabad	...	...	...	...	...					
Kaira	...	...	...	...	...					
Panch Mahals	...	...	...	...	...					
Broach	...	...	2	...	1					
Surat	74	26	49	50	46					
West Khandesh	...	...	...	...	...					
East Khandesh	...	...	...	...	...					
Nasik	5	4	4	2	...					
Ahmednagar	...	...	...	1	...					
Poona	6	10	8	9	10					
Sholapur	1	1	1	1	2					
Satara	34	28	34	30	30					
Belgaum	12	11	12	10	9	Not available.				
Bijapur	19	11	21	12	18					
Dharwar	520	477	486	505	343					
Thana	926	947	916	973	1,203					
Kolaba	1,042	1,084	1,154	1,149	1,145					
Ratnagiri	6,345	6,294	6,352	6,498	6,672					
Kanara	11,261	11,550	11,508	11,419	11,358					
Sind—										
Karachi	21	14	14	23	...					
Hyderabad	...	...	...	...	...					
Sukkur	...	...	...	...	...					
Larkhana	...	...	...	...	...					
Upper Sind Frontier ...	...	...	...	...	...					
Thar and Parkar	...	...	...	...	...					

APPENDIX C—*continued.*

Area under cultivation for different Oil-seeds—Mohra.

District.	Area.					Outturn in tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12
Presidency Proper—										
Ahmedabad	...	...	...	576	552	Not available.				
Kaira	...	136,471	111,677	136,204	138,884					
Panch Mahals	123,300	121,155	120,261	119,217	119,806					
Broach	2,386	2,480	2,629	2,602	2,673					
Surat	...	...	...	...	...					
West Khandesh	59,351	68,533	67,625	65,532	61,921					
East Khandesh	29,174	27,710	29,202	28,801	...					
Nasik	...	...	...	...	...					
Ahmednagar	...	...	...	...	...					
Poona	...	...	...	...	...					
Sholapur	...	...	...	...	...					
Satara	...	...	...	...	...					
Belgaum	...	...	...	...	...					
Bijapur	...	...	...	...	...					
Dharwar	...	...	...	...	...					
Thana	29,313	32,646	34,215	35,799	44,384					
Kolaba	...	...	...	...	...					
Ratnagiri	...	...	...	...	...					
Kanara	...	...	...	...	...					
Sind—										
Karachi	...	...	...	...	...					
Hyderabad	...	...	...	...	...					
Sukkur	...	...	...	...	...					
Larkhana	...	...	...	...	...					
U. S. Frontier	...	...	...	...	...					
Thar and Parkar	...	...	...	...	...					

APPENDIX C—*continued.*

Area under cultivation for different Oil-seeds—Linseed.

District.	Area.					Outturn in tons.				
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
Presidency Proper—										
Ahmedabad	1,061	561	571	196	52	106	58	45	16	3
Kaira	119	84	36	25	191	14	6	3	2	7
Panch Mahals	10	37	126	162	...	...	3	13	13	...
Broach	...	...	...	...	...	...	...	...	...	...
Surat	...	...	...	...	...	...	...	...	...	...
West Khandesh	5,030	2,453	5,698	16,440	8,822	102	174	636	2,267	839
East Khandesh	2,096	1,289	1,770	3,906	4,517	34	100	199	497	308
Nasik	23,430	15,649	18,620	41,135	59,107	234	713	1,724	5,895	4,353
Ahmednagar	10,721	42,320	11,378	17,319	18,140	52	646	1,153	1,925	607
Poona	950	953	915	1,475	418	19	53	45	128	7
Sholapur	17,404	18,736	19,839	24,186	21,244	207	104	1,381	3,400	1,483
Satara	3,378	3,326	3,258	3,559	3,125	108	249	324	411	216
Belgaum	1,948	2,041	1,631	2,062	2,342	92	109	213	277	222
Bijapur	56,413	71,526	52,796	56,887	62,542	1,543	4,789	5,021	11,056	5,192
Dharwar	16,876	19,245	16,648	15,813	12,223	1,356	1,134	1,204	1,907	573
Thana	...	...	...	...	...	...	...	...	...	...
Kolaba	...	...	...	...	...	...	...	...	...	...
Ratnagiri	...	...	...	...	...	...	...	...	...	...
Kanara	...	...	...	...	...	...	...	...	...	...
Sind—										
Karachi	...	...	...	...	...	...	...	...	...	...
Hyderabad	...	...	...	...	...	...	...	...	...	...
Sukkur	...	...	...	...	...	...	...	...	...	...
Larkhana	...	...	...	...	...	...	...	...	...	...
U. S. Frontier	...	...	...	...	...	...	...	...	...	...
Thar and Parkar	...	...	...	...	...	...	...	...	...	...

APPENDIX D.

General Imports.

Name of Country.							Value in rupees.					
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Til (Gingeli-seed)—												
British Empire Straits Settlement (including Labuan).	105	.....	.....	.....	261	375 6 155	945	.....	.....	.....	2,687	3,562 35 967
Hongkong	127	.....	.....	.....	70	.....	1,271	.....	.....	.....	667	.....
Zanzibar and Pemba ...	695	.....	412	1	.....	.....	8,697	.....	3,294	12	.....	.....
East Africa	.....	.....	347	.....	.....	.....	.....	.....	2,779	.....	.....	.....
Foreign Countries (Asiatic Turkey).	.....	.....	116	.....	.....	.....	.....	.....	1,010	.....	.....	.....
Turkey (Persian Gulf) ...	.....	.....	.....	.....	127	.....	.....	.....	.....	.....	1,209	.....
Persia	2,945	3,839	1,498	495	423	2,089	25,383	32,444	10,960	8,930	4,004	19,297
Japan	1,500	.....	.....	.....	.....	.....	16,500	.....	.....	.....	.....	.....
Egypt	144	.....	.....	.....	.....	.....	1,151	.....	.....	.....	.....	.....
Protectorate, East African ...	343	339	2,122	70	2,959	186	3,430	3,376	17,545	582	28,185	1,964
German East Africa ...	.....	.....	.....	.....	436	.....	.....	.....	.....	.....	4,324	.....
Other Countries	90	.....	.....	.....	14	.....	765	.....	.....	.....	140	.....
Total ...	5,949	4,178	4,495	566	4,290	2,811	58,142	35,820	35,588	4,524	41,216	25,825

APPENDIX D—*continued.*

General Imports—continued.

Articles and countries whence imported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
GENERAL IMPORTS.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Til, Gingeli Seed—												
Other Sorts—												
British Empire—												
United Kingdom ...	317	145	227	361	297	.....	22,820	17,226	23,418	39,034	52,047	.....
Aden and Dependencies ...	.....	.....	.....	21	.....	.....	.....	.....	.....	1,694	9	.....
Ceylon	67	77	183	158	75	11	1,698	2,072	5,418	5,516	3,321	334
Straits Settlement (Labuan) .	.....	152	11	78	1	4	16	2,462	650	2,770	10	112
Other Countries ...	31	3	8	33	23	.....	506	274	654	443	467	.....
Foreign Countries—												
Germany	257	27	315	20	7	.....	8,608	4,504	9,859	3,576	981	.....
Holland	451	.....	.....	2	.....	.....	5,578	55	120	473	.....	.....
France	18	25	15	14	4	.....	2,902	2,953	1,882	4,217	671	.....
Italy	5	8	2	.....	15	.....	661	730	495	20	1,062	.....
Austria—Hungary ...	3	7	6	10	5	.....	966	1,233	1,241	1,861	1,397	.....
Turkey (Asiatic) ...	75	.....	3	194	.....	.....	810	9	69	5,390	.....	.....
Persia	518	640	709	620	61	24	6,533	11,147	13,893	15,449	1,918	342
Egypt	26	630	400	64	15	.....	290	11,411	10,369	1,456	338	.....
Portuguese East Africa ...	148	803	514	172	58	135	2,715	17,028	8,233	3,377	1,209	3,502
United States of America ...	21	15	58	45	.....	.....	2,646	2,318	3,352	4,233	.....	.....
United States of America—Atlantic Coast.	.....	.....	.....	.....	24	.....	.....	.....	.....	.....	4,527	.....
Other Countries... ...	.....	.....	2	32	51	.....	43	10	83	624	1,129	.....
Total ...	1,937	2,622	2,453	1,824	636	174	56,792	73,432	79,742	89,533	69,086	4,290

Rape, seed—												
British Empire—												
United Kingdom ... Lbs.	11,708	14,506	20,220	16,664	16,316	3,056	12,171	16,089	18,859	16,700	16,382	21,586
Ceylon	1,900	.....	2,370	260	640	270	1,187	.....	1,451	175	440	214
Other Countries ...	105	.....	903	994	1,178	.....	96	.....	834	750	875	.....
Foreign Countries—												
Germany	.....	628	856	352	224	564	.....	712	1,032	456	220	552
Other Countries ...	508	8	598	432	224	.....	432	10	637	312	262	.....
Spain	.....	.....	.....	.....	.....	259	.....	.....	.....	.....	.....	291
Japan	.....	.....	.....	.....	.....	163	.....	.....	.....	.....	.....	193
Total ... Lbs	14,221	15,142	24,927	18,702	18,582	22,252	13,886	16,891	22,813	18,393	18,179	22,836
Castor Seed—												
British Empire—												
Zanzibar and Pemba ...	19	15	65	.....	.....	126	126	103	391	.....	.....	55
Foreign Countries—												
Portuguese East Africa ...	90	93	103	234	88	187	639	594	665	1,794	602	1,417
Other Countries ...	103	.....	.....	.....	.....	.....	821	.....	.....	.....	.....	.....
Total ...	212	108	168	234	88	323	1,586	697	1,056	1,794	602	1,472
Cotton—												
British Empire—												
Straits Settlement (Labuan)...	.....	.....	460	1,881	71	2	.....	.....	1,566	5,362	221	15
Other Countries ...	24	105	38	1	.....	.....	195	490	167	12	.....	.....
Foreign Countries—												
Persia	32	642	.....	142	.....	5	130	2,065	.....	438	.....	20
Other Countries ...	317	11	.....	.....	115	51lbs.	984	44	.....	3	421	52
Total ...	373	758	498	2,024	186	7	1,309	2,599	1,733	5,815	642	87
Earth Nut—												
British Empire—												
Zanzibar and Pemba ...	1	.....	302	.....	.....	183	10	.....	2,156	.....	.....	1,042
Other Countries ...	133	.....	82	.....	.....	.....	927	.....	516	.....	.....	.....
Foreign Countries—												
Portuguese East Africa ...	.....	.....	503	31	.....	3	.....	5	4,061	215	.....	35
Total ...	134	.....	887	31	.....	186	937	5	6,733	215	.....	1,077

APPENDIX D—*concluded.*

General Imports—concluded.

Articles and countries whence imported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Linseed—												
British Empire—												
Bahrein Islands ...	.....	.....	7	86	.....	151	.....	.....	50	947	.....	683
Foreign Countries—												
Germany	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	11	.....
Turkey (Asiatic)... ...	218	258	485	43	.....	.....	1,665	1,989	3,396	372	.....	.....
Arabia (Other Native States) .	195	.....	.....	.....	.....	.....	1,417	.....	.....	.....	.....	.....
Persia	3,362	5,654	9,968	7,203	12,530	77,35b	25,334	41,093	76,877	72,312	121,992	66,251
Italian East Africa (Somaliland and Erythrea) ...	.....	.....	814	10	.....	.....	.....	.....	6,188	106	.....	.....
Total ...	3,775	5,912	11,274	7,342	12,531	7,886	28,416	43,072	86,511	73,737	122,003	66,934
Poppy—												
Foreign Countries—												
Persia	7,721	3,324	1,923	2,111	3,942	973	65,302	29,673	15,614	17,969	34,155	9,225
Other Countries... ...	.....	.....	.....	31	94	.....	.....	.....	.....	288	861	.....
Total ...	7,721	3,324	1,923	2,142	4,036	973	65,302	29,673	15,614	18,257	35,016	9,225

APPENDIX E.

APPENDIX E.

Statement showing the Imports and Exports from Sind from and to Foreign Countries of Oil seeds, Oils (not being animal and mineral) and Oil cakes from 1907-08 to 1912-13.

Imports.

Articles and countries whence imported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Seeds—												
Essential—												
Oil Seeds—												
British Empire ...	2	.....	30	.....	.....	2	72	.....	403	.....	.....	72
Foreign Countries—												
Persia	66	49	227	187	131	96	1,249	1,077	4,470	4,944	4,975	2,833
Other Foreign Countries ...	.....	50	.....	.....	3	4	.....	235	.....	.....	59	83
Total ...	68	99	257	187	134	102	1,321	1,312	4,873	4,944	5,034	2,988
Non-Essential—												
Poppy—												
Foreign Countries—												
Turkey Asiatic, Persian Gulf	.....	.....	.....	201	.....	.....	.....	.....	.....	2,043	.....	.....
Other Foreign Countries.	.....	12	50	.....	8	.....	.....	117	440	.....	74	.....
Total ...	.....	12	50	201	8	.....	.....	117	440	2,043	74	.....
Rape—												
Foreign Countries—												
Mekran and Sonmiani ...	15,591	49,349	.....	.....	.....	.....	1,25,710	4,49,793	.....	.....	.....	.....
Other Foreign Countries...	.....	.....	.....	1	24	2	.....	.....	.....	8	149	10
Total ...	15,591	49,349	.....	1	24	2	1,25,710	4,49,793	.....	8	149	10
Sesamum— (Til or Jinjili)—												
Foreign Countries—												
Persia	59	813	31	.....	204	1,046	533	7,149	262	.....	2,036	9,416
Mekran and Sonmiani ...	96	178	.....	.....	.....	.....	887	1,675	.....	.....	.....	.....
Total ...	155	991	31	.....	204	1,046	1,420	8,824	262	.....	2,036	9,416

Copra or Cocoanut Kernel—												
British Empire—												
Zanzibar and Pemba ...	.....	.....	.....	.....	259	97	.....	.....	.....	.....	3,633	1,358
East African Protectorate...	250	190	.....	.....	.....	.....	3,681	2,280	.....	.....	.....	.....
Other British Possessions .	.....	14	16	.....	.....	.....	.....	221	261	.....	.....	.....
Foreign Countries ...	.....	5	.....	.....	5	.....	.....	93	.....	.....	76	.....
Total ...	250	209	16	.....	264	97	3,681	2,594	261	.....	3,709	1,358
Seeds—												
Other Sorts—												
British Empire—												
United Kingdom ...	133	116	106	159	131	.....	6,487	5,982	4,100	5,547	5,119	.....
Other British Possessions .	.....	.....	3	.....	.....	.....	.....	.....	34	.....	.....	.....
Foreign Countries—												
Egypt	.....	.....	7	1	75	.....	.....	.....	24	14	1,097	.....
Other Foreign Countries ...	1	3	7	10	27	3	40	42	132	102	1,249	42
Total ...	134	119	123	170	233	3	6,527	6,034	4,290	5,663	7,465	42
Total of Seeds ...	15,948	50,779	477	559	867	1,250	1,34,978	4,68,664	10,126	12,658	18,467	13,814
Oils—	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Essential—												
British Empire—												
United Kingdom ...	22	66	80	126	239	249	1,275	2,020	2,126	4,330	7,971	8,653
Other British Possessions...	147	1	48	.....	.....	.....	1,099	10	280	2	.....	.....
Foreign Countries—												
Germany	14	86	37	10	20	71	585	1,350	766	132	288	2,186
Other Foreign Countries ...	.....	3	2	.....	47	12	.....	119	84	.....	1,220	184
Total ...	183	156	167	136	306	332	2,959	3,499	3,256	4,464	9,479	11,023
Vegetable, not essential—												
Linseed—												
British Empire—												
United Kingdom ...	30,016	36,164	35,803	46,842	37,183	37,405	56,456	64,623	67,648	75,737	87,045	90,534
Other kinds—												
British Empire—												
United Kingdom ...	283	302	619	806	450	1,183	462	545	1,144	2,023	1,003	1,226
Other British Possessions.	.....	.....	.....	3	.....	.....	.....	.....	.....	25	.....	.....
Foreign Countries—												
Germany	.....	167	839	699	812	4,296	.....	290	1,723	1,109	1,353	4,275
Other Foreign Countries.	57	10	1	72	247	.....	118	30	10	46	15	1
Total ...	310	479	1,459	1,580	1,265	5,479	580	865	2,877	3,203	2,371	5,502

APPENDIX E—*continued.*

Exports.

Articles and countries where Exported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Seeds—												
Essential—												
Coriander—												
British Empire—												
Ceylon	.....	.....	501	375	.....	.....	.....	.....	3,706	3,439	.....	.....
Straits Settlements ...	130	.....	8,653	314	.....	.....	890	.....	71,221	3,660	.....	.....
Other British Possessions	1	4	.....	2	3	1	15	32	.....	16	50	12
Foreign Countries ...	81	51	34	32	34	33	784	479	310	396	498	396
Total ...	212	55	9,188	723	37	34	1,689	511	75,237	7,511	548	408
Cummin-(Other than black)—												
British Empire—												
United Kingdom ...	220	.....	.....	.....	.....	.....	3,520	.....	.....	.....	.....	.....
Other British Possessions	3	.....	.....	.....	.....	.....	60	.....	.....	.....	.....	.....
Foreign Countries—												
Germany	111	57	.....	.....	.....	8	2,225	2,274	.....	.....	.....	200
Other Foreign Countries.	12	18	13	4	17	2	198	304	239	81	393	30
Total ...	346	75	13	4	17	10	6,003	2,578	239	81	393	230
Cummin (Black)—												
British Empire—												
United Kingdom ...	203	.....	.....	.....	.....	.....	3,324	.....	.....	.....	.....	.....
Fenugreek—												
Btitish Empire—												
United Kingdom ...	7,860	952	1,965	4,865	.....	.....	42,071	5,712	12,779	31,679	.....	.....
Ceylon	62	40	189	320	1,074	267	340	330	1,245	1,865	6,639	1,680
Other British Possessions	53	36	.....	.....	76	.....	340	185	.....	.....	520	.....
Foreign Countries—												
Germany	.....	.....	.....	296	.....	.....	.....	.....	.....	1,567	.....	.....
Egypt	.....	.....	.....	8,207	8,542	.....	.....	.....	.....	47,934	53,812	.....
Other Foreign Countries.	47	198	123	51	111	9	271	1,167	772	310	764	62
Total ...	8,022	1,226	2,277	13,739	9,803	276	43,022	7,394	14,796	83,355	61,735	1,742

Other sorts—												
British Empire	.....	6	.....	.....	11	22	.....	60	.....	.....	129	360
Foreign Countries	10	6	.....	.....	5	2	114	60	.....	.....	44	30
Total ...	10	12	.....	.....	16	24	114	120	.....	.....	173	390
Total of Seeds Essential ...	8,793	1,368	11,478	14,466	9,873	344	54,152	10,603	90,272	90,947	62,849	2,770
Not Essential—												
Castor—												
British Empire—												
United Kingdom	15,931	6,641	3,873	2,812	1,186	933	1,07,065	45,357	25,141	20,669	8,600	7,327
Foreign Countries—												
Germany	3,308	1,016	.....	.....	.....	.....	21,529	6,983	.....	.....	.....	.....
Belgium	697	2,010	4,500	.....	.....	.....	6,221	13,490	29,250	.....	.....	.....
France	10,561	9,500	1,465	.....	.....	.....	68,592	66,737	8,790	.....	.....	.....
Total ...	30,497	19,167	9,838	2,812	1,186	933	2,03,407	1,32,567	63,181	20,669	8,600	7,327
Cotton—												
British Empire—												
United Kingdom	2,44,932	1,01,963	5,00,450	3,31,169	1,71,151	4,72,044	7,26,940	3,72,807	17,80,012	12,77,588	6,97,148	19,05,097
Other British Possessions .	12	.....	.....	3	25	.....	43	.....	.....	15	137	.....
Foreign Countries—												
Germany	.....	.....	.....	42,088	.....	.....	.....	.....	.....	1,47,133	.....	.....
France	.....	.....	6,630	30,000	.....	.....	.....	.....	2,31,000	1,20,000	.....	.....
Mascat or Oman	571	287	523	298	212	234	1,773	1,036	1,780	986	744	892
Egypt	.....	.....	555	.....	.....	.....	.....	.....	1,848	.....	.....	.....
Other Foreign Countries ...	157	90	52	24	98	101	522	329	178	78	409	479
Total ...	245,672	102,340	567,580	403,882	171,486	472,379	7,29,278	3,74,172	20,14,818	15,45,800	6,98,438	19,06,468
Groundnut—												
British Empire—												
United Kingdom	.....	.....	.....	.....	.....	104	.....	.....	.....	.....	.....	1,241
Bahrein Islands	.....	85	115	244	178	41	.....	656	1,072	1,930	1,443	360
Other British Possessions .	2	14	.....	.....	.....	.....	18	106	.....	.....	.....	.....
Foreign Countries—												
Germany	.....	.....	.....	.....	175	.....	.....	.....	.....	.....	2,629	.....
Belgium	.....	.....	.....	.....	.....	490	.....	.....	.....	.....	.....	3,430
France	.....	.....	.....	.....	1,831	.....	.....	.....	.....	.....	14,169	.....
Turkey Asiatic, Levant and Black Sea	.....	.....	.....	30	.....	.....	.....	.....	.....	240	.....	.....
Turkey Asiatic, Persian Gulf	27	168	404	489	253	277	250	1,287	2,918	3,964	1,972	3,017

AXPENDIX E—*continued.*

Articles and Countries where exported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Groundnut—												
Foreign Countries—												
Persia	8	72	267	349	165	153	60	859	2,021	2,902	1,319	1,447
Mekran and Somiani ...	133	147	.....	.....	.....	.....	1,106	1,193	.....	.....	.....	.....
Other Foreign Countries ...	.....	5	44	89	62	89	.....	48	374	766	527	755
Total ...	170	491	830	1,201	2,664	1,154	1,434	4,149	6,385	9,802	22,059	10,250
Linseed—												
British Empire—												
United Kingdom	378	.....	.....	25,840	.....	91,896	3,024	.....	.....	2,90,589	.....	10,67,904
Other British Possessions ...	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	11	.....
Foreign Countries—												
Germany	.....	.....	.....	.....	.....	31,853	.....	.....	.....	.....	.....	3,73,431
Holland	.....	.....	.....	.....	4,000	.....	.....	.....	.....	.....	47,160	.....
Belgium	.....	.....	.....	18,252	14,796	1,460	.....	.....	.....	2,19,178	1,75,278	11,984
France	.....	.....	.....	2,210	.....	2,000	.....	.....	.....	26,080	.....	24,200
Foreign Countries	.....	.....	.....	.....	.....	36	.....	.....	.....	.....	.....	488
Total ...	378	.....	.....	46,302	18,797	1,27,245	3,024	.....	.....	5,35,847	2,22,449	14,78,007
Mustard—												
British Empire—												
United Kingdom	.....	.....	1,276	443	.....	.....	.....	.....	8,940	3,099	.....	.....
Other British Possessions...	15	.....	.....	.....	38	.....	140	.....	.....	.....	250	.....
Foreign Countries	1	9	.....	107	94	.....	12	50	.....	742	659	.....
Total	16	9	1,276	550	132	.....	152	50	8,940	3,841	909	.....
Rape—												
British Empire—												
United Kingdom	628,220	154,144	495,796	689,995	347,732	417,892	41,00,760	12,09,183	29 92,895	43,71,281	23,57,635	33,41,292
Aden and depen dencies ..	796	.....	.....	.....	.....	.....	5,852	.....	.....	.....	.....	.....
Other British Possessions...	.....	18	.....	.....	17	.....	.....	120	.....	.....	100	.....

Foreign Countries—												
Germany	674,506	517,803	1,453,512	1,155,445	723,114	904,459	54,89,630	41,18,842	1,08,10,907	85,46,861	54,02,025	72,95,855
Spain	6,000	2,736	.....	.....	.....	.....	54,195	24,705	.....	.....	.....	.....
Belgium	711,477	467,614	1,476,294	1,326,059	1,626,108	1,362,115	54,87,138	38,17,055	1,04,71,879	94,01,341	1,21,47,693	1,11,68,358
Holland	.....	.....	8,000	.....	4,000	6,000	.....	.....	62,634	.....	28,908	48,000
France	625,405	206,339	741,793	570,898	509,058	580,686	50,14,654	16,92,372	50,54,856	38,75,212	37,33,300	46,56,341
Italy	4,125	.....	.....	200	.....	.....	37,260	.....	.....	1,440	.....	.....
Austria-Hungary	38,003	30,185	1,280	25,558	38,547	17,002	346,655	2,42,428	9,240	1,86,001	2,83,362	1,41,804
Other Foreign Countries ...	1	.....	.....	.....	.....	.....	6	.....	.....	.....	.....	.....
Total ...	2,688,533	1,378,839	4,176,675	3,768,155	3,248,576	3,288,154	2,05,36,150	1,11,04,705	2,94,02,411	2,63,82,136	2,39,53,023	2,66,51,651
Sesamum (Til or Jinjili)—												
British Empire—												
Aden and dependencies ...	146	900	541	73	.....	341	1,327	9,096	5,490	584	.....	3,800
Bahrein Islands	15	117	135	114	77	51	160	916	964	1,028	737	550
Other British Possessions...	90	.....	7	7	.....	.....	900	.....	70	75	.....	.....
Foreign Countries—												
Germany	44,959	76,922	23,003	48,390	22,998	23,000	5,23,630	8,39,747	2,32,710	5,00,404	2,51,976	2,66,816
Belgium	37,147	86,107	163,302	219,764	129,095	108,944	4,53,354	8,81,839	16,14,700	22,41,137	13,14,896	14,11,678
France	17,605	20,980	152,327	257,586	30,242	72,167	1,96,304	2,16,480	15,23,035	25,92,240	3,10,476	10,41,002
Italy	.....	.....	.....	4,000	.....	.....	.....	.....	.....	40,000	.....	.....
Austria-Hungary	4,000	.....	56,634	44,070	34,205	92,782	40,000	.....	5,70,056	4,42,682	3,65,466	11,34,744
Turkey Asiatic, Red Sea...	.....	.....	133	.....	.....	.....	.....	.....	1,050	.....	.....	.....
Turkey Asiatic, Levant and Black Sea	.....	.....	.....	88	.....	37	.....	.....	.....	528	.....	500
Turkey Asiatic, Persian Gulf	1	.....	.....	15	12	.....	9	.....	.....	160	80	.....
Muskat or Oman	2	58	130	82	91	16	28	499	1,074	687	789	142
Persia	158	22	438	214	294	316	1,214	240	3,685	1,573	2,825	3,097
Egypt	.....	.....	.....	296	226	.....	.....	.....	.....	2,468	1,810	.....
Other Foreign Countries ...	77	2	75	120	.....	.....	753	20	525	840	.....	.....
Total ...	104,200	185 108	396,725	574,819	217,240	297,654	12,17,679	19 48,837	39,53,359	58,24,406	22,79,055	38,62,329

APPENDIX E—*continued.*

Articles and Countries where exported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Copra or cocoanut kernal—												
British Empire	.....	.....	.....	3	19	9	.....	.....	.....	50	309	200
Foreign Countries— Mekran and Sonmiani ...	58	77	.....	.....	.....	.....	1,100	1,221	.....	.....	.....	.....
Other Foreign Countries ...	1	7	32	13	26	27	22	108	492	265	517	647
Total ...	59	84	32	16	45	36	1,122	1,329	492	315	826	847
Poppy seed—												
Foreign Countries— Belgium	.....	.....	.....	.....	.....	318	.....	.....	.....	.....	.....	4,140
Other Foreign Countries ...	.....	3	1	4	3	5	.....	29	6	32	42	58
Total ...	.....	3	1	4	3	323	.....	29	6	32	42	4,198
Other sorts—												
British Empire— United Kingdom	61	3	505	9	11	.....	328	110	3,326	130	135	.....
Foreign Countries— Germany	.....	.....	.....	137	147	9	.....	.....	.....	3,875	6,000	500
Other Foreign Countries ...	10	.....	.....	.....	6	.....	90	.....	18	.....	70	.....
Total ...	71	3	505	146	164	9	418	110	3,344	4,005	6,205	500
Total of seeds not essential	3,069,537	1,685,960	5,153,430	4,797,871	3,660,248	4,187,887	2,26,91,542	1,35,64,619	3,54,52,444	3,43,26,538	2,71,90,780	3,39,21,577
Total of seeds	3,078,330	1,687,328	5,164,908	4,812,352	3,660,106	4,188,231	2,27,45,694	1,35,75,222	3,55,42,716	3,44,17,485	2,72,53,629	3,39,24,347
Oils—	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.						
Vegetables not essential—												
Castor—												
British Empire— United Kingdom ...	.....	.....	.....	.....	.....	243	.....	.....	.....	.....	.....	600
Other British Possessions	.....	.....	585	14,846	4,804	300	.....	.....	885	29,565	9,240	600
Foreign Countries	260	53	.....	175	.....	5	645	90	.....	430	.....	20
Total ...	260	53	585	15,021	4,804	548	645	90	885	29,995	9,240	1,220

Cocoanut—												
British Empire	.....	4	79	40	85	355	.....	9	125	92	160	935
Foreign Countries	552	403	203	248	283	494	1,311	860	477	516	645	1,205
Total ...	552	407	282	288	368	849	1,311	869	603	608	805	2,140
Cotton-seed oil—												
Foreign Countries—												
Germany	.....	.....	.....	.....	.....	1,313	.....	.....	.....	.....	.....	2,635
Linseed—												
British Empire—												
United Kingdom	.....	.....	37,823	16,766	.....	16,825	.....	.....	66,811	20,001	.....	47,025
Other British Possessions ...	.....	.....	.....	.....	.....	20	.....	.....	.....	.....	200	70
Foreign Countries	20	5	.....	17	60	5	60	12	.....	47	.....	15
Total ...	20	5	37,823	16,783	60	16,850	60	12	66,811	20,048	200	47,110
Mustard or Rape—												
British Empire—												
United Kingdom	.....	.....	13,600	.....	4,018	39,278	.....	.....	25,200	.....	9,462	67,731
Bahrein Islands	200	96	708	501	1,121	298	406	200	1,155	1,300	1,909	633
Other British Possessions ...	.....	20	.....	246	413	.....	.....	36	.....	353	945	.....
Foreign Countries—												
Muskat or Oman	1,331	732	2,133	2,342	3,252	2,318	2,295	1,360	3,664	3,778	5,891	4,463
Persia	488	874	1,806	1,579	1,673	1,204	969	1,605	3,311	2,969	3,069	2,519
Mekran and Sonmiani ...	3,943	3,145	.....	.....	.....	.....	7,513	5,887	.....	.....	.....	.....
Other Foreign Countries ...	.....	63	36	94	176	.....	.....	124	64	180	395	.....
Total ...	5,962	4,930	18,283	4,762	10,653	43,098	11,183	9,212	33,394	8,580	21,671	75,346
Til or Gingily—												
British Empire ...	81	21	316	384	447	50	162	42	594	732	915	105

APPENDIX E—*continued.*

Articles and places where exported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Til or Gingilly—*continued.*												
Foreign Countries—												
Maskat or Oman	1,100	968	1,215	3,792	2,524	1,195	2,561	2,438	2,249	7,348	4,190	2,785
Other Foreign Counries ...	607	587	116	167	149	141	1,537	1,196	268	382	275	346
Total ...	1,788	1,576	1,647	4,343	3,120	1,386	4,260	3,676	3,111	8,462	5,381	3,236
Other Sorts—												
British Empire—												
United Kingdom	18,093	.....	14,182	2,612	.....	227	47,955	.....	23,340	5,670	.....	650
Other British Possessions ...	.....	.....	.....	.....	8	.....	.....	.....	.....	.....	20	.....
Foreign Countries	.....	.....	.....	531	590	255	.....	.....	.....	928	272	540
Total ...	18,093	.....	14,182	3,143	598	482	47,955	.....	23,340	6,598	292	1,190
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.						
Oil-cake—												
British Empire—												
United Kingdom	6,775	5,260	5,105	8734	4,844	.....	33,276	23,106	28,530	46,521	34,935	.....
Ceylon	11,241	.....	.....	3,862	564	.....	33,686	.....	.....	15,386	1,861	.....
Other British Possessions ...	.....	.....	.....	2	.....	.....	.....	.....	.....	10	.....	.....
Foreign Countries—												
Germany	406	.....	.....	.....	.....	.....	1,988	.....	.....	.....	.....	.....
Other Foreign Countries ...	42	27	72	35	.....	.....	149	111	267	125	.....	.....
Total ...	18,464	5,287	5,177	12,233	5,408	.....	69,099	23,217	28,797	62,042	36,796	.....

Castor-cake	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		.....
Total ...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cocoanut-cake (Punak)—												
British Empire	.....	.....	.....	.....	.....	322	.....	.....	.....	.....	.....	1,369
Foreign Countries—												
Germany	.....	.....	.....	.....	.....	311	.....	.....	.....	.....	.....	2,120
Other Foreign Countries ...	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	6
Total	.....	.....	.....	.....	.....	634	.....	.....	.....	.....	.....	3,495
Cotton-cake	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Groundnut cake	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Linseed, Rape and Sesamum-cake—												
British Empire—												
United Kingdom	.....	.....	.....	.....	.....	9,368	.....	.....	.....	.....	.....	67,033
Ceylon	.....	.....	.....	.....	.....	477	.....	.....	.....	.....	.....	1,869
Foreign Countries—												
Germany	.....	.....	.....	.....	.....	1,471	.....	.....	.....	.....	.....	10,403
Other Foreign Countries ...	.....	.....	.....	.....	.....	9	.....	.....	.....	.....	.....	48
Total ...	.....	.....	.....	.....	.....	11,325	.....	.....	.....	.....	.....	79,353
Other Sorts—												
British Empire—												
United Kingdom	.....	.....	.....	.....	.....	918	.....	.....	.....	.....	.....	7,491
Ceylon	.....	.....	.....	.....	.....	638	.....	.....	.....	.....	.....	2,732
Foreign Countries	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	12
Total ...	.....	.....	.....	.....	.....	1,561	.....	.....	.....	.....	.....	10,235
Total of Oil-cake	.....	5,287	5,177	12,233	5,408	13,518	.....	2,347	28,797	62,042	36,796	93,083

APPENDIX E—*continued.*

Articles and places where exported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Seeds—												
Essential—												
Bombay—Chief Port ...	2,661	1,896	2,681	2,085	4,897	2,835	34,540	22,470	36,089	30,641	58,802	38,243
Other Ports	.....	.....	.....	.....	.....	84	.....	.....	.....	.....	.....	771
Other Presidencies	36	.....	.....	12	.....	44	288	.....	.....	100	.....	450
British Ports within the Province	34	41	67	64	126	92	305	421	451	910	1,341	821
Indian Ports not British ...	177	472	604	486	964	423	1,065	2,738	2,970	6,701	9,323	3,580
Total ...	2,908	2,409	3 352	2,647	5,987	3,478	36,199	25,629	39,510	38,352	69,466	43,865
Castor—												
British Ports in other Presidencies	.....	120	.....	.....	.....	.....	.....	840	.....	.....	.....	.....
British Ports within the Province	.....	.....	3	2	4	2	.....	.....	10	6	20	14
Cutch	17,473	6,743	7,598	471	.....	.....	1,05,595	41,255	45,628	2,680	.....	.....
Kathiawar	7,782	9,927	.....	167	7	1	50,993	65,645	.....	950	45	8
Total ...	25,255	16,790	7,601	640	11	3	1,56,588	1,07,740	45,638	3,636	65	22
Earthnuts—												
Bombay—Chief Ports	8,297	13 665	13,106	11,083	13,047	9,915	69,308	1,18,015	1,05.573	90,130	97,079	80,701
Bombay—Other Ports	1,117	2,456	5 342	6,685	4,941	2,179	8,883	20,840	39,034	55,676	41,387	19,545
Other Presidencies	.....	782	.....	70	1	1	.....	6,064	.....	560	10	10
British Ports within the Province	18	39	54	93	136	129	146	301	384	705	1,036	1,031
Indian Ports not British ...	13	2	7	921	1,018	661	95	16	60	8,058	8,344	4,580
Total ...	9.445	16,944	18,509	18,852	19,143	12,885	78,432	1,45,236	1,45,051	1,55,129	1,47,856	1,05,867

Rape Seed—												
British Ports in other Presidencies ...	1,716	.....	.....	.....	.....	1,193	15,018	.....	.....	.....	2	7,870
British Ports within the Province ...	1,359	133	1,050	1,563	18	111	6,989	684	5,679	6,713	99	608
Baluchistan Agency tracts ...	.....	.....	36,390	12,372	35,326	18,716	.....	.....	2,61,435	82,390	2,85,782	1,40,744
Indian Ports not British ...	.....	.....	.....	.....	.....	34	.....	.....	.....	.....	.....	268
Total ...	3,075	133	37,440	13,935	35,344	20,054	22,007	684	2,67,114	89,103	2,85,883	1,49,490
Til or Jinjily—												
Bombay—Chief Port ...	2,219	1,219	1,612	1	564	270	23,701	12,006	14,407	7	6,740	2,700
Do. Other Ports ...	.....	.....	.....	.....	163	.....	.....	.....	.....	.....	2,111	.....
Other Presidencies ...	146	.....	221	154	146	.....	876	.....	1,800	1,550	1,022	.....
British Ports within the Province ...	136	228	328	296	19	9	1,627	2,127	2,511	2,631	181	107
Káthiáwár ...	10,644	35,302	3,777	4,532	.....	8,712	1,09,025	3,52,776	33,786	42,805	.....	90,409
Other Indian Ports not British ...	.....	.....	46	379	432	105	.....	.....	330	3,648	4,495	852
Total ...	13,145	36,749	5,984	5,362	1,324	9,096	1,35,229	3,66,909	52,834	50,641	14,549	94,068
Other Sorts—												
British Ports in other Presidencies ...	189	893	358	1,144	442	522	1,920	6,228	3,786	9,327	4,115	5,315
British Ports within the Province ...	2,502	236	1,905	34	166	30	10,571	954	7,913	194	657	187
Indian Ports not British ...	54	106	1,022	532	1,138	811	1,602	3,576	4,783	5,599	4,102	6,755
Total ...	2,745	1,235	3,285	1,710	1,746	1,363	14,093	10,758	16,482	15,120	8,874	12,257

APPENDIX E—*continued.*

Articles and places where exported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Oils—												
Vegetable, not essential—												
Cocoanut—												
Bombay—Chief Port ...	2,153	2,482	7,190	3,053	8,095	14,375	4,305	4,537	14,872	6,784	20,391	35,608
Madras—Other Ports ...	106,064	105,322	110,597	160,964	197,226	262,087	2,57,647	1,91,715	2,26,529	3,80,364	4,56,906	6,32,761
British Ports within the Province ...	404	347	704	811	967	918	987	713	1,225	1,703	2,264	2,249
Indian Ports not British ...	.....	.....	.....	.....	160	.....	.....	.....	.....	.....	450	.....
Total ...	108,621	108,151	118,491	164,828	206,448	277,380	2,62,939	1,96,965	2,42,626	3,88,851	4,80,011	6,70,618
Linseed—												
British Ports in other Presidencies ...	3,122	3,825	1,230	4,425	.....	2,970	6,256	7,927	2,455	8,776	.....	6,143
British Ports within the Province ...	.....	11	9	.....	.....	.....	.....	17	21	.....	.....	.....
Indian Ports not British ...	.....	.....	.....	.....	15	.....	.....	.....	.....	.....	30	.....
Total ...	3,122	3,836	1,239	4,425	15	2,970	6,256	7,944	2,476	8,776	30	6,143
Til or Jinjili—												
Bombay—Chief Port ...	7,212	2,330	2,635	1,960	6,651	1,790	15,793	4,784	4,562	3,972	14,642	4,089
Bombay—Other Ports ...	139	.....	1,105	.....	908	.....	400	.....	2,335	.....	2,041	.....
British Ports within the Province ...	449	430	442	348	408	406	952	895	808	696	875	875
Indian Ports not British ...	2	8	.....	.....	.....	599	5	15	.....	.....	.....	1,267
Total ...	7,802	2,768	4,182	2,308	7,967	2,795	17,150	5,694	7,705	4,668	17,558	6,231

Other sorts—												
British Ports in other Presidencies ...	1,773	1,628	186	93	1,804	5,719	3,085	2,630	483	301	2,890	11,716
British Ports within the Province ...	766	583	1,176	1,333	727	1,041	1,422	1,172	1,864	2,137	1,540	2,028
Indian Ports not British ...	960	680	.....	.....	70	.....	1,440	945	.....	.....	122	.....
Total ...	3,499	2,891	1,362	1,426	2,681	6,760	5,947	4,747	2,347	2,438	4,552	13,744

APPENDIX E—*continued.*

Statement showing the exports from Sind to Coast Ports of seeds, oils and oilcake from 1907-08 to 1912-13.

Articles and countries where exported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
	Cwts.	Cwts	Cwts.	Cwts.	Cwts.	Cwts.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Seeds—												
Essential—												
Bombay—Chief Port ...	2,643	3,413	7,045	6,688	1,493	1,118	21,458	25,881	53,085	49,514	15,359	8,528
Do. Other Ports ...	11	6		162	16	.....	88	40	259	1,143	198	.....
Madras—Chief Port ...	.....	.....	1,246	80	102	205	.....	.....	10,214	1,009	700	1,562
Do. Other Ports ...	5,862	2,678	11,385	7,754	7,431	1,025	35,925	19,088	85,543	60,982	48,156	8,835
Other Presidencies ...	.....	.....	176	.....	.....	.....	.....	.....	1,200	.....	.....	.....
British Ports within the Province ...	48	60	67	51	114	86	472	404	407	709	1,308	901
Indian Ports not British ...	239	148	818	547	266	313	2,558	1,303	7,200	4,979	2,630	3,505
Total ...	8,803	6,305	20,768	15,282	9,422	2,747	60,501	46,806	1,57,908	1,18,327	68,351	23,331
Cotton—												
British Ports in other Presidencies ...	15	85	27	822	354	22	60	308	75	2,451	1,210	85
British Ports within the Province ...	1,122	1	952	.....	154	11	3,055	4	3,473	.....	602	40
Cutch ...	10,047	6,726	7,848	9,028	21,497	32,440	32,164	25,315	27,856	33,837	80,242	1,24,508
Káthiáwár ...	106,001	91,274	73,147	96,879	146,764	277,091	3,38,071	3,36,853	2,42,279	3,49,398	5,12,142	10,60,636
Other Indian Ports not British ...	.....	.....	.....	.....	13	31	.....	.....	.....	.....	48	138
Total ...	117,185	98,086	81,974	106,729	168,782	309,595	3,73,350	3,62,480	2,73,683	3,85,686	5,94,244	11,85,407
Linseed—												
Bombay—Chief Port ...	848	1,258	2,123	750	.....	.....	7,722	10,907	16,312	6,385	.....	.....
Indian Ports not British ...	.....	.....	.....	1	.....	.....	.....	.....	.....	12	.....	.....
Total ...	848	1,258	2,123	751	.....	.....	7,722	10,907	16,312	6,397	.....	.....

Mustard—												
Bombay—Chief ort ...	1,442	2,500	6,160	10,006	.....	.....	10,013	16,555	39,526	54,135	.....	.....
Do. Other Ports ...	.....	7	.....	.....	.....	.....	.....	45	.....	.....	.....	.....
Madras—Other Ports ...	1,272	2,052	65	242	199	467	9,246	17,213	580	2,431	1,189	4,200
British Ports within Province,	1,493	33	.....	.....	20	7	8,176	194	.....	.....	120	45
Indian Ports not British ...	.....	35	1	.....	17	4	.....	301	8	.....	105	34
Total ...	4,207	4,627	6,226	10,248	236	478	27,435	34,308	40,114	56,566	1,414	4,279
Rape—												
Bengal—Chief Port ...	1,129	.....	.....	495	.....	979	6,860	.....	.....	3,000	.....	7,878
Bombay—Chief Port ...	22,251	24,120	11,086	6,546	4,752	5,818	1,85,147	2,01,827	82,331	37,405	26,034	45 042
Other Presidencies ...	72	154	.....	.....	.....	.....	504	1,540	.....	.....	.....	.....
British Ports wit 'n the Province ...	1,269	137	2,270	1,592	18	118	6,289	644	10,692	6,677	99	660
Indian Ports not Britis ...	25	2	77	.....	551	687	173	17	343	.....	4,324	5,148
Total ...	24,746	24,413	13,433	8,633	5,321	7,602	1,98,973	2,04,028	93,366	47,082	30,157	58,728
Til or Jinjily—												
Madras—Other Ports ...	.....	3	475	26,472	1,318	5,730	.....	30	3,866	32,940	13,010	55,157
Other Presidencies ...	.....	2	.....	1	163	500	.....	15	.....	10	1,655	5,000
British Ports within the Province ...	126	250	261	270	26	9	1,191	2,291	2,154	2,488	217	77
Káthiáwár ...	409	315	1,274	538	1,631	48	4,326	2,247	8,685	3,609	16,140	370
Other Indian Ports not British ...	10	287	798	53	276	304	108	2,729	6,079	380	2,877	3,111
Total ...	545	857	2,808	27,334	3,414	6,591	5,525	7,312	20,784	2,39,427	33,899	63,715
Other sorts—												
British Ports in other Presidencies ...	504	526	.....	664	605	1,190	3,675	4,209	.....	4,276	3,255	8,816
British Ports within th Province ...	29	42	52	96	153	100	254	339	371	727	1,155	845
Indian Ports not British ...	96	91	336	395	732	294	977	812	2,692	3,134	5,312	2,503
Total ...	629	659	388	1,155	1,490	1,584	4,906	5,360	3,063	8,137	9,722	12,164

APPENDIX E—*continued.*

Articles and countries where exported.	Quantity.						Value.					
	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
Oils—	Gal s.	Galls.	Galls.	Galls.	Galls.	Gall	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Essential—												
Indian Ports not British ...	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	40	.....
Vegetable, not essential—												
Mustard or Rape—												
British Ports in other Presidencies ...	258	52	.....	9	126	.....	616	90	.....	18	229	.....
British Ports within the Province ...	1,879	446	1,346	1,430	741	974	2,169	989	2,257	2,193	1,476	2,046
Indian Ports not British ...	6,332	3,291	4,815	8,988	6,354	4,242	10,944	5,881	7,866	14,087	11,171	8,578
Total ...	7,769	3,779	6,161	10,427	7,221	5,216	13,629	6,960	10,123	16,298	12,876	10,624
Other kinds—												
British Ports in other Presidencies ...	8	80	111	.....	2,912	36	24	160	222	.....	1,600	145
British Ports within the Province ...	1,113	869	1,150	1,099	1,729	1,300	2,572	1,829	2,044	2,313	3,863	3,047
Indian Ports not British ...	1,593	881	1,707	2,386	2,539	3,121	3,542	1,610	3,458	4,987	5,381	7,560
Total ...	2,714	1,830	2,968	3,485	7,180	4,457	6,138	3,599	5,724	7,300	10,844	10,752
Oil cake—	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.						
Bombay—Chief Port	1,565	1,883	2,069	1,521	3,357	5,832	5,345	7,537	8,078	5,459	15,034	27,132
Do. Other Ports	20	67	60	.....	.....	44	61	216	242	.....	.....	90
Madras—Other Ports	171	.....	1,297	4,543	2,979	696	513	.....	3,891	15,963	9,155	2,781
British Ports within the Province ...	.....	.....	.....	.....	.....	22	.....	.....	.....	.....	.....	88
Indian Ports not British ...	232	200	226	360	741	156	761	794	867	1,176	3,029	690
Total ...	1,988	2,150	3,652	6,424	7,077	6,750	6,680	8,547	13,078	22,598	27,218	30,781

Food values of some Indian feeding stuffs.

No.	Names.	Album.	Analysis.		Total Food Units.
			Fat.	Carbo Hyd.	
1	Decorticated Cottonseed Cake ...	37·5	9·0	28·0	144·2
2	Guar	32·0	3·0	44·0	131·5
3	Linseed Cake	28·0	10·0	29·0	125·0
4	Tilseed Cake	28·0	12·0	24·0	124·0
5	Chuni	20·0	3·5	54·0	122·7
6	Gram	30·0	3·0	39·0	121·5
7	Khursani Cake	27·0	12·0	20·0	117·5
8	Rapeseed Cake	28·0	9·0	24·0	116·5
9	Wheat Bran	15·0	4·0	58·0	105·5
10	Bajri	9·0	4·0	72·0	104·5
11	Copra Cake	13·0	10·0	44·5	102·5
12	Cottonseed	12·5	15·0	32·0	100·7
13	Beans and Peas	20·0	4·0	50·0	98·0
14	Kardi Cake	16·0	4·0	41·5	95·5
15	Maize	5·8	3·3	70·0	94·0
16	Cottonseed Hulls	5·0	1·5	51·0	67·2
17	Kadbi	5·0	2·0	48·0	65·5
18	Hay	5·0	2·0	40·7	58·0
19	Green Fodder	2·0	0·9	13·0	20·0

Cotton seed in tons.

	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
Ahmedabad	20,931	18,943	33,337	31,035	2,460
Kaira	1,317	922	1,115	1,114	1,154
Panch Mahâls	822	465	901	921	1,022
Broach	28,931	30,179	41,904	36,317	24,098
Surat	16,567	11,902	18,791	16,871	13,927
West Khándesh	7,221	20,191	37,856	39,866	17,048
East Khándesh	22,325	59,347	85,336	89,448	65,667
Násik	1,155	1,098	4,370	9,129	9,193
Ahmednagar	2,257	1,019	12,541	9,100	1,830
Poona	70	16	925	1,019	144
Sholápur	431	509	8,079	3,868	1,650
Sátára	1,238	1,353	844	970	813
Belgaum	9,164	8,911	14,548	20,409	7,502
Bijápur	19,183	10,483	33,206	37,750	26,618
Dhárwár	34,921	19,825	39,534	41,451	17,664
Thána	...	...	...	...	...
Kolába	...	...	...	...	...
Ratnágiri	...	...	...	...	...
Kánara	...	...	...	...	...
Sind	...	...	...	...	...
Karáchi	61	20	4	103	265
Hyderabad	21,625	13,206	18,128	16,089	48,881
Sukkur	429	470	190	153	97
Lárkána	67	37	20	11	21
Upper Sind Frontier ...	151	45	67	82	47
Thar and Párkar	31,332	26,277	22,645	22,033	...

Name of Seed.	Latin Name.	Vernacular Equivalent.
Sesame ...	Sesamum Indicum ...	Yellu, Til, Tir, Tal.
Groundnut ...	Arachis Hypogœa ...	Mung-phali, Bhui-mung, Bhui-singh.
Castor seed ...	Ricinus Communis ...	Erandi, Oudla.
Mowra ...	Bassia Latifolia ...	Dol, Moha.
Safflower ...	Carthamus Tinctorius ...	Kardi, Kusumbi, Kusbi, Kabri.
Cottonseed ...	Gossypium ...	Kapasia.
Poppyseed ...	Papaver Somniferum ...	Khus-Khus.
Niger ...	Guizotia Abyssynica ...	Khursani, Gurellu.
Linseed ...	Linum Usitatissimum ...	Alshi, Javas, Agashi.
Rape ...	Brassica ...	Sarsav, Sarreh, Rai.
Cocoanut ...	Cocos Nucifera ...	Kopara.
Karanja ...	Pongamia Glabra ...	Karanja.

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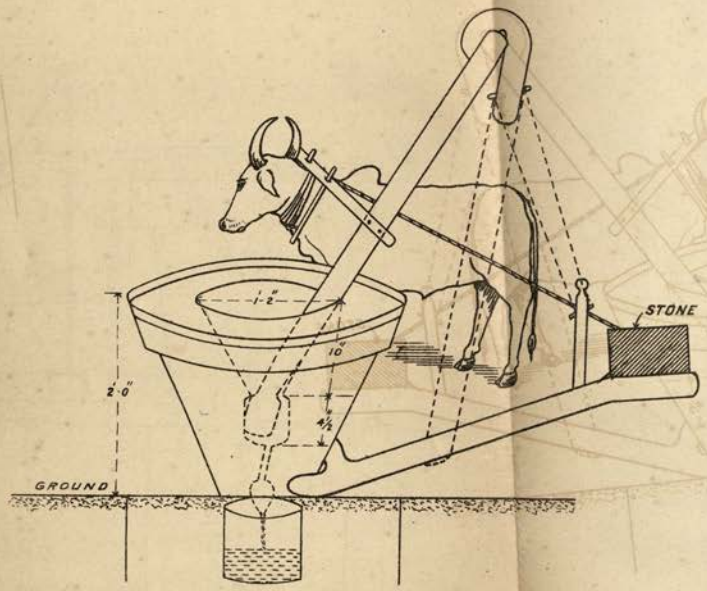

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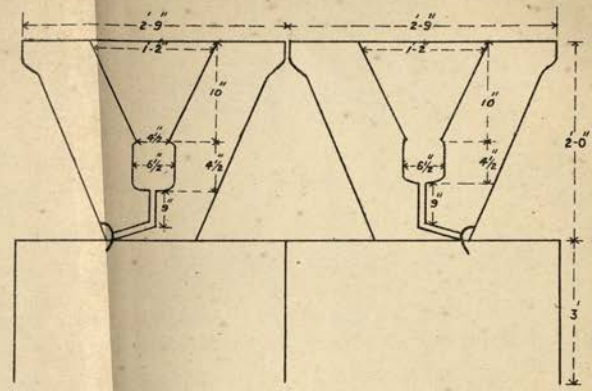

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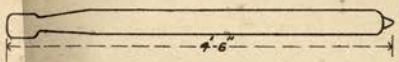

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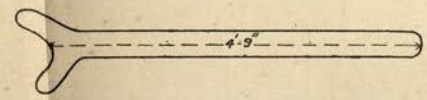

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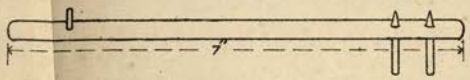

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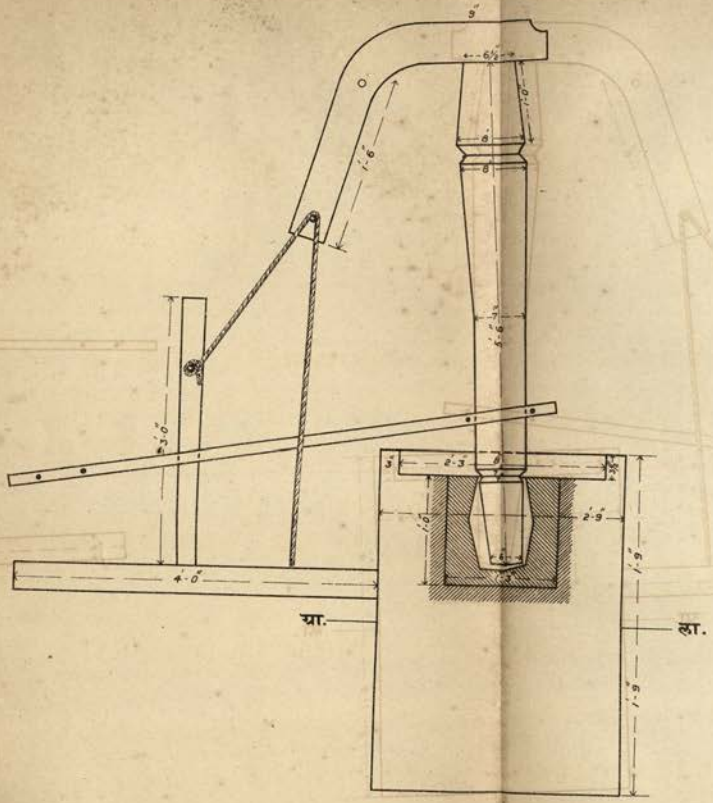

The whole work outside the central work is made of stone. The receptacle for oil is however made of wood. The oil when it collects in the central hollow receptacle, is taken out after soaking a piece of cloth and squeezing the same in another receptacle. There is no pipe as in the case of "Kolu" through which the oil can be made to flow. In this continuance, the oil seed is used with husk on and the oil is not required to be boiled and repressed as is done in "Kolu."

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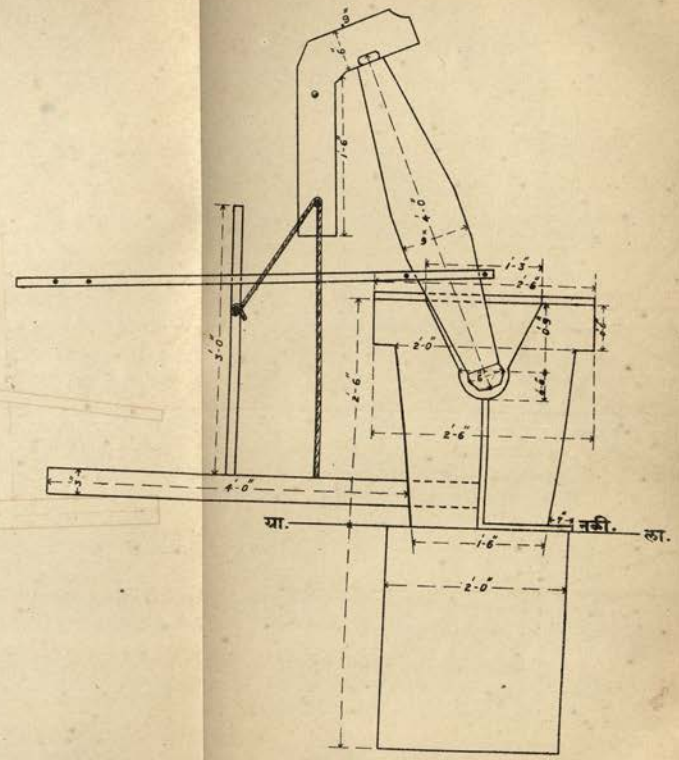
कोलु घाणा.



NOTE:—The whole work is made of wood. Seed is used after removing the husk. The oil which flows out through the pipe at the bottom is required to be boiled and repressed, before it can be obtained in a pure form.

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LETTERS

ADDRESSED TO THE

DEKKHAN AGRICULTURISTS' RELIEF ACT COMMISSION

ON THE

SUBJECT OF MONEY-LENDERS' ACCOUNTS.

110614